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LIQUIDAMBAR.

EDITION IN COLORS

Familiar Trees and their Leaves

Described and Illustrated by

F. Schuyler Mathews

Author of Familiar Flowers, Familiar Life in Field and Forest, and Familiar Features of the Roadside

With Illustrations in Colors and over Two Hundred Drawings by the Author, and an Introduction by Prof. L. H. Bailey, of Cornell University

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PREFACE TO THE EDITION IN COLORS.

One of the most interesting things in connection with the study of nature and the pursuit of art is the study of color. It would take a massive volume profuse with illustrations to adequately describe and portray those phases of color which are common at any hour of the day in the field and woodland.

Trees have their moods as well as men, and these are expressed in color which is influenced by, and largely dependent upon, sunlight and atmospheric conditions. To be sure, it is not quite possible to perfectly represent these moods in a process reproduction of a water-color study; but a suggestion of such character is far better than the complete absence of it, and, it must be acknowledged, modern processes are wonderfully faithful to form and the touch of the artist's brush.

With the hope of more clearly expressing by illustration the life and moods of some of our common trees, the publishers have added to this new edition the likenesses, in color, of the birch, maple, red spruce, liquidambar, and other familiar charac-

ters of the field and forest. My sketches in water-color were therefore intentionally impressionistic. I avoided all those petty details which the camera could have given with minute fidelity, and aimed for color and effect, for mass and character.

Whether the effort was successful or not remains for the reader to judge. At all events the reproductions deserve to be kindly received, because *color* invariably involves such a stupendous amount of labor in the process of duplication (a fact which few appreciate or understand), and mechanical results are so extremely uncertain even in the hands of a skilled workman. But there is one good point about *process*: it does not superimpose another man's hand between the artist and his reproduced picture. It does not distort his drawing, nor does it ignore his technique; in fact, it has now proved itself a fair means of attaining both color and form with some degree of fidelity. A mere black-and-white photograph fails to tell half the truth of nature. In June, when the maple and the liquidambar are verdant green, the lifeless photograph takes no account of the fact. Nothing short of palette and brush in the hands of an artist can tell the truth about the field and forest on a rare day of June. The lilac shadows, the purple tree trunk, the emerald foliage, the cobalt sky, the warm pink tone of the atmosphere on what is commonly called "an artist's day"—these are not to be photographed. The colored fire of

cloud and sky, the soft emerald of the meadow broken by the lilac-blue shadow of the stately elm —what can the camera tell of these?

We have some little record of these colors in the tree pictures; they tell how the oak differs from the maple, and the tupelo from either. We must not expect more; it is a simple chromatic demonstration, beyond the boundary of photography.

Regarding the scientific nomenclature which is adopted for this book, one word of explanation is necessary. The names are those of Dr. Asa Gray, and his successors connected with the University of Harvard; the addition of Dr. Sargent's scientific names I considered particularly necessary in deference to his magnificent work, The Silva of North America, to which we must all of us go for a wider knowledge of tree life. All other systems of nomenclature, however *popular* they may seem to be, seem to me both unnecessary and unreliable, as well as conducive of much confusion, especially to the younger generation. We certainly are in safe hands if we depend upon the botanists of Harvard University. It is not necessary to say more than that.

F. Schuyler Mathews.

May 1, 1901.

PREFACE.

Possibly there are some of us who may not think that a leaf is a thing of beauty. We are prone to use the expression "Nothing but leaves," as though leaves were the worthless, homely, and uninteresting things of an otherwise beautiful creation. They certainly *are* common, but they are far from *commonplace*. If we doubt this, let us try to draw or paint a single leaf. Only a great artist can depict *all* of some *one* of its manifold truths; one may draw ever so carefully and well, yet he can not tell with the pencil or the brush all the truth and beauty of one leaf. Its color is too waxen and pure to be imitated by earthy pigments; its outline is too subtile, its teeth are too finely and vigorously formed, and its veins are too infinitely complex for one to copy with absolute, lifelike accuracy. No, it is not possible to portray all the beauty of a leaf with the pencil. Yet this work of Nature's wonderful art is common: the world is

filled with untold billions of leaves, *no two of which are exactly alike.*

It is undoubtedly the fact that we do not fully appreciate either the beauty or the usefulness of trees; but after we have become really familiar with them, and have learned readily to distinguish the different species, we find ourselves in a new world of absorbing interest, in which beauty and use have expanded to proportions far beyond our previous conceptions.

I have ventured to draw the trees and their leaves just as I have found them. My two hundred and odd sketches were all taken from Nature, and only sixty of these from pressed specimens which were obtained at the Harvard Botanic Garden. Yet I have found the world of truth and beauty, as far as leaves are concerned, so limitless, that types and rules seemed valuable only as guide-boards are on a strange path: a typical leaf does not reveal all the leaf truth, any more than a guide-board notes all the turns and twists in the path.

I have considered it neither wise nor necessary to confine the drawings to a uniform scale; many of them are about one half natural size, but the remainder are adjusted to the limited space which the book allows. As often as the case requires, the dimensions of a leaf are recorded.

The botanical names which are given the first place are those which are taken from Gray's Field, Forest, and Garden Botany; these find a universal acceptation in this country. Those which hold the second place conform with a recent system of nomenclature instituted by Prof. C. S. Sargent, through whose kindness I am enabled to make my list complete.

The introduction of the red spruce as a distinct species, and not as a variety of the black spruce, and also the expression of any views regarding the character of a species, must not be mistaken for an intention on my part of indulging in a botanical opinion. As a student and lover of Nature, I must beg the privilege of simply exercising a choice between disputed botanical points, which is, of course, consistent with my own profession.

I wish to acknowledge the kind assistance received from Dr. B. L. Robinson, Prof. L. H. Bailey, and Prof. C. S. Sargent, without whose advice I could never have completed my work satisfactorily. I am also greatly indebted to Prof. J. G. Jack, Mr. C. E. Faxon, Mr. Jackson Dawson, and Mr. Newlin Williams for their valuable suggestions and the acquisition of many needed specimens. Indeed, without this help it would have been impossible for me to gather all the material necessary to make my list include over two

hundred trees. This is not so very many for one to become acquainted with, and it is at least a serviceable introduction to the life of the woods.

The stillness of the vast forest, broken only by the silvery, organ-pipe notes of the hermit thrush, is something so strangely opposite to the city's whirl and confusion, that we think of the wilderness as without life; but in reality it is all life: the trees and their countless leaves live in a world about which we know little—we with our lives hemmed in by walls of stone. But when the summer comes, then the stifling air and the hot pavements force the truth upon us—they are dead! and, exhausted with the city's heat, we echo the wish of the poet Whittier:

> Bring us the airs of hills and forests,
> The sweet aroma of birch and pine;
> Give us a waft of the north wind laden
> With sweetbrier odors and breath of kine.

F. Schuyler Mathews.

El Fureidis, Blair, Campton, N. H.,
May, 1896.

INTRODUCTION.

TREE growth is a constant source of wonder to one who contemplates Nature. The rigid bole, the bracing and far-searching roots, the outspreading top with its myriad members and its infinite variety of form and expression, all combine to make an organism in which strength, durability, gracefulness, and tenderness are all at once the dominant characteristics. In all the range of Nature there is no object which so commonly inspires the tenderer and finer emotions, and which would leave the earth so bare of loveliness if it were to be removed. Itself devoid of personality, it still lends itself to the expression of all the feelings of the heart. It is gay or sad, warm or cold, peaceful or restive, the reflection of the passing mood of the observer. Every one loves the trees, though he may not know it, and it often happens that those love them best who know them least. I mean to say that one who attempts to analyze the kinds and species may wholly overlook the tree itself in his search

for details. The tree exists as an individuality wholly aside from its name and classification and botanical technicalities. There are, then, two ways of knowing a tree. One is the way of human feeling and sympathy, through which a tree becomes a part of one's self, as the sunshine does. It is identified with every hallowed experience. The influence of its benignant branches throws a savor into the commonest nooks and corners of our lives. Another way to know the tree is the botanical or analytical way. This method sternly scrutinizes every detail. This is essential to truth, but not to feeling. It is so likely to restrict and dwarf the vision and the sympathies as to make the tree but a laboratory filled with curiously fashioned mechanisms. Some persons are slaves to facts. There are botanists, no doubt, who know all the kinds of trees, but who have never seen the greenness and verdure and sublimeness of the woods.

Yet, despite the narrow vision which may come from the analytical study of plants, there is no inherent reason why the person who traces the veins in the leaf, counts the seeds in the pod, and unravels the structure in the wood, may not also see the tree of which all these charming details are but the various parts. Fortunately, the greater number of persons will always desire to know the tree as an entirety; but they may enjoy it the more if at the same time

they have some knowledge of its kinships and its names. The name is the index to all that has been written about it,—a means of learning its range, its habits, and its uses. Such persons approach the tree in a different spirit than the botanist does. They want an easy and personal method of apprehending it. They have no desire to discover or record scientific facts. They are not of the analytical turn of mind. They simply want an introduction to the trees whom they meet. Their desire is as legitimate as the botanist's, and it is more necessary that it be satisfied. The botanist can make his own helps, if need be. I am glad of every new book, therefore, which invites people to see and to know Nature. That method of treatment is best which interests the greatest number of persons. If only the statements are clear and accurate, the critic has no right to condemn the book. If the book is made for the people, time is the only judge of its merits. As foliage is the most obvious feature of trees, aside from form, it would seem that leaf-forms afford the most useful basis of introduction to a common knowledge of trees; and if, in addition, the artist draws and describes the objects as he sees them, the result must be beneficent.

L. H. Bailey.

Cornell University, *May, 1896.*

A PLAN FOR LEAF IDENTIFICATION.

All leaves may be divided into five general classes, as follows:

I. Simple alternate-growing leaves.
II. Simple opposite-growing leaves.
III. Compound alternate-growing leaves.
IV. Compound opposite-growing leaves.
V. Evergreen leaves, of the Pine family.

The first four classes which comprise the deciduous leaves are subdivided into two classes, as follows:

1. Without teeth.
2. With teeth.

These two classes are again subdivided, as follows:

A. Edge not divided or cut into.
B. Edge divided or cut into.

Class V is subdivided as follows:

1. With long needles.
2. With short, flat, blunt needles, or with soft needles.
3. With short, sharp needles, or with scales.

Under this general classification the leaves are arranged in botanical succession through the following chapters:

I. Simple alternate leaves:

1. Without teeth.	A. Edge not divided.	Chap. II.
	B. Edge divided.	Chap. III.
2. With teeth.	A. Edge not divided.	Chaps. IV to IX.
	B. Edge divided.	Chaps. X to XIII.

II. Simple opposite leaves:

1. Without teeth.	A. Edge not divided.	Chap. XIV.
2. With teeth.	A. Edge not divided.	Chap. XV.
	B. Edge divided.	Chap. XVI.

III. Compound alternate leaves:

1. Without teeth.	Leaflets bordering main leaf stem.	Chap. XVII.
2. With teeth.	Leaflets bordering main leaf stem.	Chap. XVIII.

IV. Compound opposite leaves:

1. Without and with teeth.	Leaflets bordering main leaf stem.	Chap. XIX.
2. With teeth.	Leaflets radiating.	Chap. XX.

V. Evergreen leaves, of the Pine family:

1. With long needles.	Chap. XXI.
2. With short, flat, blunt needles, or with soft needles.	Chap. XXII.
3. With short, sharp needles, or with scales.	Chap. XXIII.

COLORED PRINTS OF TREES.

	FACING PAGE
Liquidambar	*Frontispiece*
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THE PAINTED BEECH.

FAMILIAR TREES AND THEIR LEAVES.

CHAPTER I.

THE LEAF AS A BUILDER.

The trees may be justly numbered among our best friends, for the simple reason that our lives are inseparably connected with and greatly benefited by them. But we need to know our leafy friends better. It is not enough to be able to distinguish an ash from a hickory, or a fir from a spruce; it is more important by far that we should become acquainted with the form and character of the leaves, the fruit, and the bark and thus acquire a fuller knowledge of the way the tree lives.

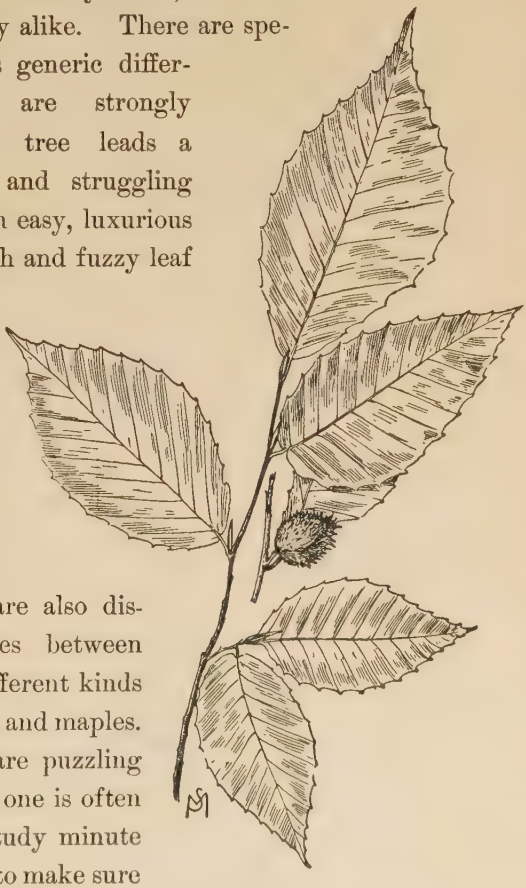
To *know* a tree is to become familiar with the purpose and condition of its life. This is revealed in no small measure by the leaves. The needle of the pine enables the tree to withstand a hurricane on a mountain top, yet its slender figure is perfectly adapted to the task of gathering light and air for the

tree's life. The broad-leaved buttonwood would fall before the gale which the pine successfully weathers.

"The rough and fuzzy leaf of the Slippery Elm."

Not less plainly does the diversity of character in a leaf reveal the diversity of tree life itself. No two leaves are exactly alike; no two trees are exactly alike. There are specific as well as generic differences which are strongly marked. One tree leads a rugged, wild, and struggling life; another an easy, luxurious life. The rough and fuzzy leaf of the slippery elm, the silky leaf of the beech, the shiny leaf of the gray birch, these are all widely different; but there are also distinct differences between the leaves of different kinds of birches, elms, and maples.

Still, there are puzzling similarities, and one is often compelled to study minute details in order to make sure of a particular species.

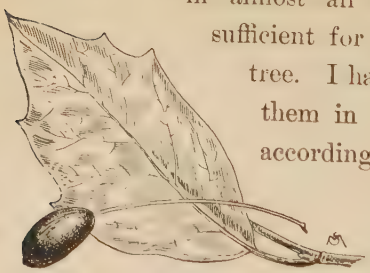


"The silky leaf of the Beech."

We find no more than just so many berries on a stem, and this fact decides a species; the leaves grow just so many in a cluster, and this decides another species; the bark is marked thus and so, and there is no further doubt about yet another species.

Nyssa biflora;
usually two berries.

It is plain, therefore, that by comparative examination we can decide beyond peradventure what the tree is by its leaf, its fruit, or its bark. But it is with the leaves that we have chiefly to do; in almost all cases their assistance is sufficient for the identification of the tree. I have consequently arranged them in the succeeding chapters according to a progression from simple to complex forms.



Nyssa uniflora;
not more than one berry.

Fig. A is the simplest form of a leaf; it is without divisions and has an entire and unbroken edge. But this is not all which we must look at; it is a most important fact to know *how* the leaf grew. Did it spring

from the twig in alternate order with its neighbors, or did it grow *opposite* a neighbor? Fig. B shows how leaves grow alternately; but Fig. C also shows how alternately-growing leaves sometimes *double up*, and, growing thus in pairs, appear to be opposite. But

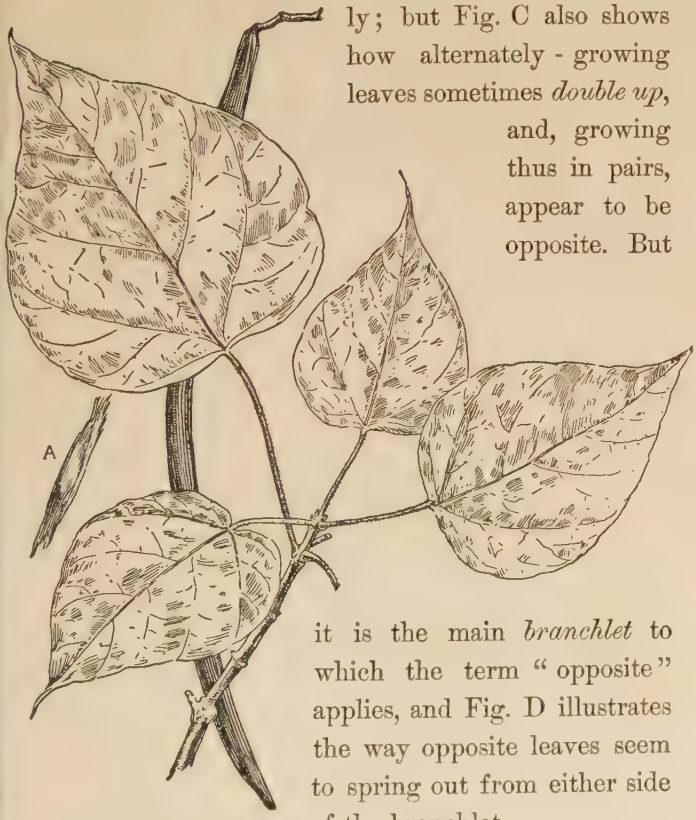


Fig. A.—Catalpa Leaf.

it is the main *branchlet* to which the term "opposite" applies, and Fig. D illustrates the way opposite leaves seem to spring out from either side of the branchlet.

The next simple form of a leaf is one which is divided or "cut into," but is

Fig. B.—Yellow Birch.

Fig. C.—Black Birch.

FIG. D.—Striped Maple.

still without a toothed edge. The lobed leaf of the sassafras is a good illustration of this type (see Fig. E).

Fig. E.—Sassafras Leaf.

The toothed leaf of the yellow birch (see Fig. B) comes next among the simpler forms; but even this type is not quite as simple as that of the beech leaf (see the second drawing in this chapter), for the birch as well as the slippery-elm leaf is double-toothed, while the beech leaf is the plainest, shallowest-toothed affair which Nature has designed. Perhaps *Viburnum dentatum*, which will be found in a succeeding chapter, has a leaf almost correspondingly simple, but the teeth are cut deeper, and the veining is not nearly so plain.

The silver-maple leaf comes next in order (see Fig. F); this leaf is both divided and toothed, but

Fig. F.—Silver-Maple Leaf.

Fig. 6.—Buttonwood Leaf.

it is an extreme type. A less pronounced variety of this sort of leaf is Fig. G; here there are hardly

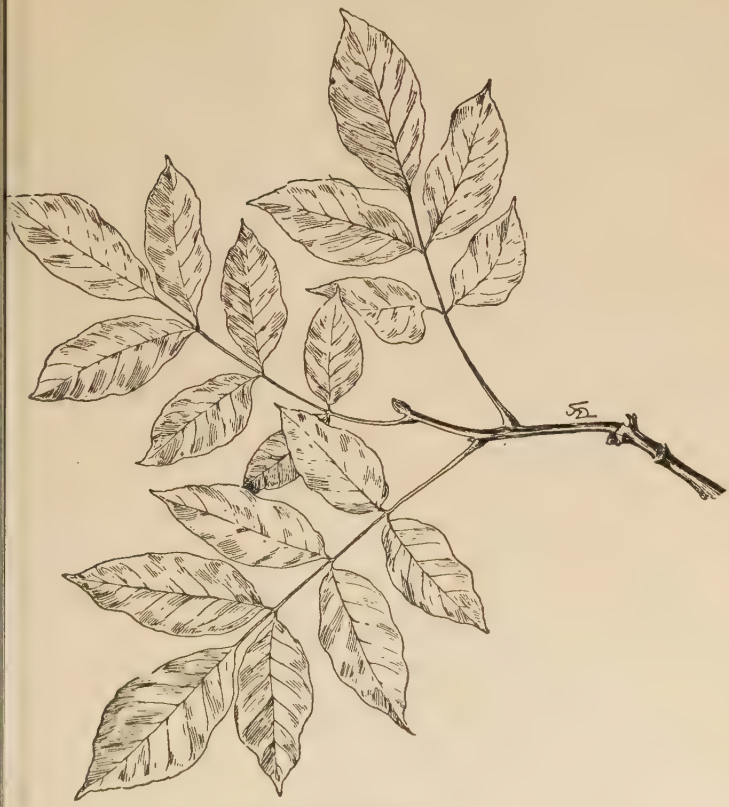


Fig. H.—White Ash.

any teeth at all, and the few are large enough to be called "divisions," or, better yet, subdivisions.

Fig. I.—Pignut.

Next in order comes a compound leaf without teeth, and following it one with teeth. (Figs. H and I illustrate these two types perfectly.) Lastly comes the horse-chestnut leaf, which has a radiating form (see Fig. J), which is the extreme type of complexity in a leaf.

These types comprise all the leaves of trees outside of the pine family; the needle leaves of the latter are too simply formed to require explanations beyond those given in the chapters devoted to the evergreens. The possession of a simple method whereby we may identify a tree by its leaf is a stepping stone to a better knowledge of the tree itself. It seems a strange fact that we do not fully comprehend the great value of the billions and billions of leaves that clothe the vast forests which, as time progresses, are slowly disappearing before the axe. The cubic feet of lumber which a tree yields are not nearly as valuable to us as the leaves which the living tree puts forth season after season.

The greatest sphere of usefulness which a tree occupies is connected with its life. It is a great air-purifier; it absorbs from the atmosphere the carbonic-acid gas which is poisonous to us; it holds and slowly dispenses moisture which the parched air needs; it gives out the ozone (or oxygen in an active electro-negative condition) which is peculiarly conducive to

Fig. J.—Horse-Chestnut Leaf.

our health; and it modifies heat which would otherwise be overpowering. Step into the thick woods from an open space on a very hot day, and immediate relief is experienced from the intense heat. This is not wholly the result of shade furnished by the trees; much of it proceeds from the modification of the air through the breathing of the tree leaves. These leaves not only absorb heat and sunlight, but also carbonic-acid gas, and through tiny channels transmit them to the growing wood fiber of the tree.

The fact is, a tree is built up far more by the sun and the atmosphere than it is by the soil from which it grows. In the delicate structure of the leaf, which, upon close examination, we will see is composed of a complicated net work of nervelike "veins," carbonic-acid gas is broken up into carbon, which is retained by the tree to form its woody structure, and into oxygen, which is liberated and passes into the atmosphere. Each leaf, therefore, is a builder and an air-regulator of a nature which is beneficial to us. Its capacity for heat and sunshine is something astonishing. I have estimated that a certain sugar maple of large proportions, which grows near my cottage, puts forth in one season about four hundred and thirty-two thousand leaves; these leaves combined present a surface to sunlight of about twenty-one thousand

six hundred square feet, or an area equal to pretty nearly half an acre. Every inch of this expanse breathes *in* life for the tree, and *out* health for man, while it absorbs in the aggregate an enormous amount of heat and sunlight. In time of rain it also holds the moisture, and allows it to evaporate by slow degrees when hot days return. The forests are vast sponges, which, through the agency of leaves, soak up the beneficent raindrops and compel them to pass slowly through shaded channels to the parched lands beyond. It is indeed quite impossible to overestimate the value of the billions and billions of leaves which work and build for the benefit of humanity. Only forty per cent of a tree is utilized by the woodsman; the pity of it is that the waste is so fearfully out of proportion to the gain. I do not say that a waste of leaves is a very serious loss, but I do say that the wanton destruction of more than half the tree, with its thousands of leaf-workers, is inexcusably careless.

A tree is most likely felled at an immature age;* how much larger it would grow if given an extra ten years' lease of life some of us would be astonished to learn. In that time a sugar maple I call to mind, at

* Spruce and pine "sticks" (the trimmed logs) are floated down the Merrimack River to the lowland mills by thousands, not one of which measures more than nine or ten inches in diameter,

first but eight feet high, grew to measure fully thirty feet, and expanded over a space three times as great as that it originally occupied. An elm, now probably thirty years old, in the same length of time added fifteen feet to its stature, and spread ten feet in the radius of a circle. This tree is before me as I write. Another, which stood four feet high in 1870, and twenty feet in 1885, now reaches over thirty-five feet above the point it started from. A white pine, which ten years ago had a stem as thick as a *portière* pole, and a height only a trifle superior to my own, I can now walk under without stooping; its trunk measures twenty-three inches in circumference, and its topmost bough is twenty feet above the ground. Four firs, which ten years ago measured twelve feet, now stand over twenty feet high. A silver maple, which I planted when it was but four inches high, in ten years grew nearly twenty feet. Two sugar maples, which looked like bean poles when they were set out in 1875, are now symmetrically egg-shaped, and reach far above the ridgepole of the neighboring house; in ten years' time I estimate that these trees expanded six feet in all directions, and their trunks nearly doubled their diameter.

The imperceptible and irresistible force with which a tree grows I have found curiously demonstrated in a certain butternut, around which was built

a rustic arbor some ten years ago. The roof was unwisely fastened close about the trunk, to exclude the rain; now the rafters are forced asunder fully six inches on either side of the tree, and an opening of that width shows itself in the arbor roof. What is most astonishing is the way three or four six-inch iron spikes have retained their original position, while the wood has been forced (regardless of the nail-heads) entirely beyond them.

According to recent tests, it takes a pulling force of six tons to dislodge a six-inch nail. Think, then, of a tree growing with an irresistible pushing force of thirty-six thousand pounds, and this merely the trunk expansion! It is remarkable, also, to see how a tree apparently growing out of a bowlder holds it with an iron grasp, as its vigorous roots (much in the way one's fingers encircle a ball) pass over it on their way down to the nourishing soil below. There are several trees growing this way in the charming woods opposite the Flume House, Franconia Mountains; one may see them beside the path leading to the Pool.

The life of a tree is not only interesting, but it is of more value to us than we can easily estimate. The loss of large areas of air-vivifying leaves is a menace to our health. Forests prevent sudden changes of temperature in all seasons of the year; they decrease

the frequency of destructive frosts in early autumn, and they maintain an equable climate in winter; they absorb and give out heat more slowly than the open fields, and they act as a screen to land lying to the leeward of blasting winter winds. When we interest ourselves in tree life we begin to realize how great a worker and builder the leaf is. It builds the tree, and it works for our benefit. So intimately is it connected with the tree life, that from it proceeds a tiny channel, or nerve, so to speak, down the trunk to the very root of the tree. John Ruskin, in Modern Painters, vol. iv, speaks thus of the leaf-worker: "It leads a life of endurance, effort, and various success, issuing in various beauty; and it connects itself with the whole previous edifice by one sustaining thread, continuing its appointed piece of work all the way from top to root."

CHAPTER II.

I. Simple Alternate Leaves.

1. Without teeth. A. Edge undivided.

THE MAGNOLIAS, ETC.

The simplest possible leaf which grows on a tree —I ought rather to say, *which helps to build one*— we will find on the Southern magnolia. This tree, which leads all others in botanical classification, puts forth a leaf of the plainest design we can discover in Nature—a leaf of an elliptical figure with pointed ends, plain as the plainest New England farmhouse without cornice, dormer, or column, and quite as refreshingly simple.

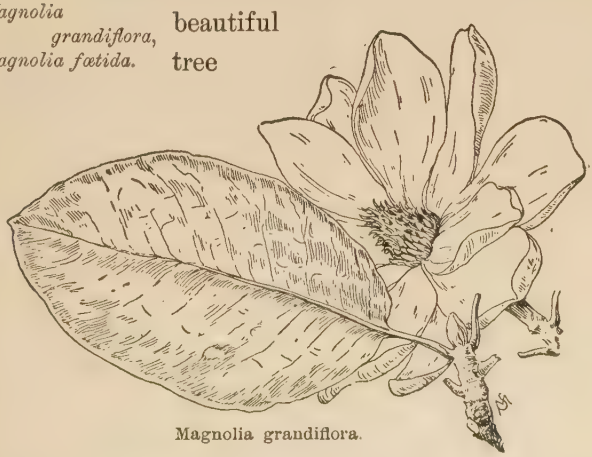
The magnolias are distinctly Southern trees, with dark, shining, evergreen leaves, which are more or less out of tune with a Northern environment. Just as the sober olive has its perfect setting in the brilliant light and color of Italy and Syria, so the deep-hued magnolia finds its most congenial surroundings in the sunny South; and no doubt Nature is aware of this fact, for she does not allow the trees to ex-

pand to their normal size in the North. The magnolia in New Orleans is quite a giant compared with his fellow which has been exiled to bleak New England. Away from the Southern swamps or the picturesque streets and gardens of Mobile and New Orleans, separated from its natural associates, the pecan, cypress, and fig tree, the magnolia can not be seen in the prime of its strength and beauty.

Great-flowered Magnolia, or Bull Bay.

Magnolia grandiflora, Magnolia fœtida.

The finest of the species is the great-flowered magnolia, or bull bay. In the South this beautiful tree

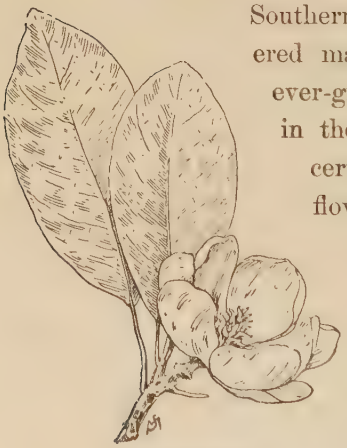


Magnolia grandiflora.

reaches a height of from 60 to 80 feet; its trunk, which is not infrequently as much as four feet in diameter, is of a harsh brown gray color, and is covered with scales about an inch in length. The deep-

green leaf is from five to eight inches long, *thick*, shiny above, and somewhat rusty beneath. The majestic and lilylike flowers measure seven or eight inches across; they are cream-white, exceedingly fragrant, and bloom from April to June in the South, but as late as early August in the North.

The finest growth of this tree, according to Prof. Sargent, is in western Louisiana, where it forms a conspicuous feature of the forest.* It grows wild in river swamps and pine barrens as far north as the Carolinas, and is a most familiar and beautiful object in the streets and gardens of the Southern cities. This great-flowered magnolia, the only perfectly ever-green species, is not hardy in the North—a pity, for it is certainly the most magnificent flowering tree of our country.



Magnolia glauca.

Small Magnolia—Sweet Bay. *Magnolia glauca.* The small magnolia, or sweet bay, is a slenderer tree, frequently reduced to the condition of a shrub in the North, but southward it attains a

* *Vide* Silva of North America, C. S. Sargent.

height of 50 feet or more, and has a trunk two or three feet in diameter if circumstances are favorable to a perfect development. Its bark is light brown-gray; the new twigs are decidedly green, and turn a ruddy hue as they grow older. The leaves are thick, oval-shaped, obtuse, and at most not over six inches long; the middle rib is very prominent, the stem slender, and the surface below very whitish. In the South the old leaves remain on the tree until the new ones appear; in the North they fall in November. The cream-white flowers are much the same shape as the yellow pond lily, roundish, and bloom from May to August; they are also fragrant. This tree, frequently seen in gardens, in its *wild* state is never found north of Gloucester, Mass., and is merely local there; it appears also beside the red maple and andromeda bush in the deep swamps of New Jersey; from there it extends southward near the coast, and forms with the loblolly and red bay almost impenetrable thickets in Florida, especially in the interior swamps and pine barrens.*

Cucumber Tree.
Magnolia acuminata.

The cucumber tree in the South grows from 50 to 90 feet high, but attains only a moderate size in the North. In beauty it is not to be compared with the

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* *Vide* Silva of North America, C. S. Sargent.

luxuriant, sweet-flowered magnolias. The somewhat tulip-shaped flowers, which come late in spring, are three inches wide, greenish yellow-white, and fragrant.

Magnolia acuminata.

The leaves are rather thin, dark green above, lighter green and slightly downy below, and they measure from seven to ten inches in length. They are widely distributed along the branch and not clustered at the end. The orange-red seeds of the peculiar, curved fruit-cone ripen in autumn; * when green, the cone resembles a small cucumber; it is about two or three inches long. The wood is soft, durable, and light; it has been extensively used for pump logs and water troughs. This tree grows wild from western New York southwestward to Arkansas, and southward to southern Alabama; it is one of the largest of

* The seeds, on being released from the pods, hang suspended by little white filaments, like those of the great and small magnolias.

the magnolias, and is a rapid grower, but its narrow-petaled flowers are rather poor-looking in comparison with the beautiful white ones of the two foregoing species.

Yellow Cucumber Tree.

Magnolia cordata.
Magnolia acuminata, var. cordata.

The yellow cucumber tree has really beautiful *lemon-yellow* flowers, which form a very dainty color combination with its rich foliage. This tree is a native of Georgia and South Carolina; it has been cultivated in gardens for nearly a century, and its beauty is deserving of close attention. It is found to be quite hardy as far north as Boston, where it survives the cold of that trying climate.* The leaves are similar to those of the foregoing species, but they are broadly oval, decidedly woolly-white beneath, and less pointed at the ends.

Magnolia cordata.

* There are two specimens of this tree in the botanic garden of Harvard University.

Gray says they are seldom cordate * (heart-shaped at the base). The yellow flowers are often slightly streaked with red. The tree grows from 20 to 50 feet high.

Magnolia macrophylla.

Great-leaved Magnolia.

Magnolia macrophylla.

The great-leaved magnolia is a Southern tree, with huge, deep-green leaves (sometimes not less than thirty inches long) clustered at the summit of the branches; they are also woolly-white beneath, and are narrowed down to *two small scallops* at the base. The bell-shaped flowers are truly Brobdingnagian, for they measure fully eight and even twelve inches across. They are mildly fragrant, and are cream-white, of a very soft tone, with a dull pinkish spot at the base of the petal. The tree grows from 30 to 50 feet high, and is found in its wild state from Kentucky and North Carolina southward. It is cultivated as far north as Boston, where, in Jamaica Plain, one of the suburbs, there are two beautiful

* The species name *Magnolia cordata* was given it by the younger Michaux; but Prof. Sargent considers this magnolia a variety of *M. acuminata.*

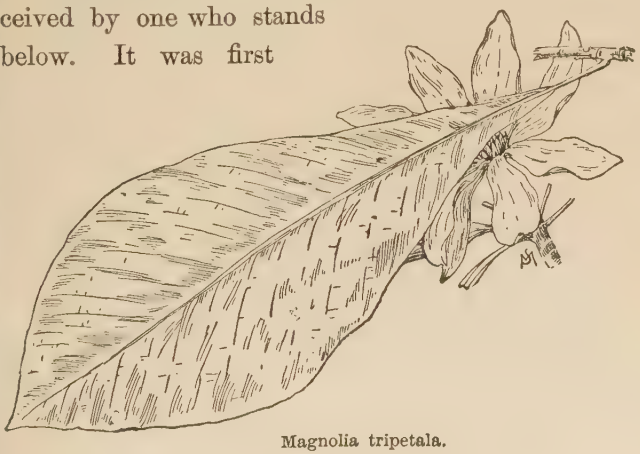
MAGNOLIA MACROPHYLLA.

From a photograph by Mr. A. R. Wilmarth, Jamaica Plain, Mass.

specimens about 20 feet high, some of whose flowers measure nine inches in diameter.

Umbrella Tree.
Magnolia Umbrella.
Magnolia tripetala.

The umbrella tree gets its name from the resemblance which the leafy ends of the branches bear to an umbrella, the leaves being arranged in a circle, with veins and stems radiating from a common center; the umbrella-like appearance is readily perceived by one who stands below. It was first



Magnolia tripetala.

called parasol or umbrella tree by the early settlers in the South. The leaves are from eighteen to twenty inches long, deep green above and lighter green beneath; they are *downy* (on the under side) when young, but soon grow smooth. The cream-white flowers, six to eight inches across, with rather

narrow petals, have a strong and somewhat disagreeable odor; they bloom in May and June. The height of the umbrella tree is from 30 to 40 feet; its branches are usually contorted, and after sprawling out quite a distance from the trunk they turn up and grow nearly parallel with it. The bark is light gray, smooth, but sometimes blistered.

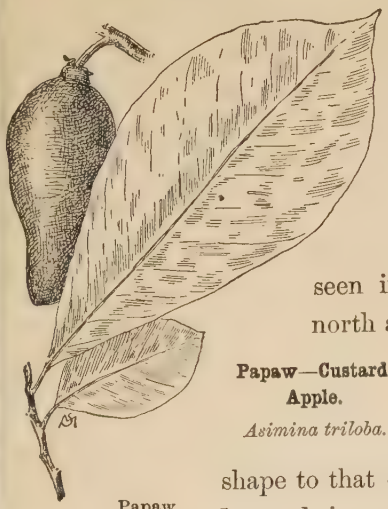
The tree is found in parks and gardens; it grows wild from New York southward, along the Alleghany Mountains, and attains its greatest size in the valleys extending from the western slopes of the Great Smoky Mountains in Tennessee; southward its limit is central Alabama, and westward, southwestern Arkansas.

Ear-leaved Umbrella Tree. *Magnolia Fraseri.*

The ear-leaved umbrella tree grows from 30 to 40 feet high. The flowers, six to nine inches in diameter, are cream-white, slightly sweet-

Magnolia Fraseri.

scented, and bloom from May to June. The leaf, scarcely a foot long, is similar to that of the umbrella tree, but is conspicuously heart-shaped at the base.



Papaw.

Papaw—Custard Apple.
Asimina triloba.

This tree is found from southwestern Virginia southward; westward it extends to the valley of the Pearl River, Mississippi; and it is seen in cultivation as far north as New York city.

The papaw, or custard apple, has a leaf similar in shape to that of *Magnolia Umbrella*, and is another Southern tree which does not attain its normal proportions in the North. In rich soil and a warm climate the tree will grow to a height of 35 feet or more. It is sometimes cultivated, but grows wild from New York southward, and westward to southern Michigan and Texas. The best growth is found in the valleys of streams which are tributary to the lower Ohio River. Nearly all parts of the unfortunate tree smell badly, including the flowers, which are

prettily triple-formed and have a soft, purplish-red hue. The leaves are eight to twelve inches long, thin, rusty-downy beneath when young, but eventually smooth. The straight trunk, perhaps ten inches in diameter, has smooth, shiny, silver-gray bark; the branches, marked lengthwise with little grooves, are slender and spreading, with bark of a light reddish-brown color. The fruit of this tree is rather shapeless and bulky, three to five inches long, yellow and soft inside, dark brown and wrinkled outside, and has a fragrant, sweet taste greatly prized by the Southern negro. It is ripe in September or early October. In the unripe condition the greenish skin is smooth, with a bloom, and the pulp is disagreeable to the taste. It is said that the fruit has the most delicate flavor after having been frozen. In the South, where the trees are common, the fruit is brought into market; but, at best, those who like it must confess to an acquired taste.

Red Bud.

Red Bud—Judas Tree.
Cercis Canadensis.

The red bud is a very small tree, 40 or 50, but commonly not over 25 feet high, famous for the beauty of its dainty clusters of small pale crim-

son-magenta flowers, the petals lighter, which appear from March till May before the leaves are out. These leaves are four inches long, dark green, smooth and glossy, and perfectly heart-shaped; they turn yellow in the fall. The French Canadians use the acid flowers in their salads and pickles. The name "Judas tree" is handed down to us by tradition; in olden times it was believed that this tree was the one on which Judas hanged himself. The red bud is common from New York southward and westward to Alabama and Missouri, and is most abundant in Indian Territory and eastern Texas; it is also frequently seen in cultivation. There is a very pretty but small specimen opposite the Public Library on Millmont Street, Roxbury, Mass.

Tupelo—Sour Gum.
Nyssa sylvatica.

The tupelo or sour gum reaches its finest proportions in the South, but it is more or less common from central New York southward, and westward to Michigan. In the extreme Northeast it may occasionally be found as far as Vermont and southern Maine; but I have never seen the tree in New Hampshire. It is medium

Tupelo (Nyssa sylvatica).

in size (rarely it grows 45 feet high), and has horizontal branches, a rough grayish trunk, and elliptical pointed leaves about two to five inches long, dark shiny green above but lighter below. The leaves turn a brilliant dark red in the autumn. The wood is exceedingly close-grained, tough, and hard to split; for this reason it is employed in the making of hubs, pulleys, and mauls. In Virginia it is much used by the ship-builders.

Water Tupelo.

Water Tupelo.
Nyssa biflora.
Nyssa sylvatica, var. biflora.

The leaf of the water tupelo is very nearly like that of the foregoing species, but it is smaller; we must rely, therefore, on other means for the identification of the tree. It grows from the pine barrens of New Jersey southward. The blue fruit is smaller, and the stone is decidedly flattened and strongly ridged; this is not the case in the other tupelo, which bears a larger fruit with a rounder stone (ovoid) scarcely ridged at all.

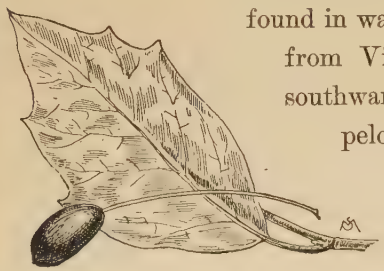
Large Tupelo.
Nyssa uniflora.
Nyssa aquatica.

The large tupelo bears a leaf from four to ten inches long, which is sometimes angularly toothed, and often quite downy beneath; it is also apt to be a

SOUR GUM OR TUPELO.

Bucks Co., Penn.

trifle heart-shaped at the base. This tree bears solitary flowers, and fruit about an inch long with a flattened and ridged stone. It is found in water or deep swamps, from Virginia and Illinois southward. These three tupelos may easily be distinguished apart, by reason of their different fruit and flowers; for instance, one can not find *Nyssa biflora* with more than three flowers on one stem, and in the greatest number of cases it has only two. The single flower or fruit also unmistakably indicates *N. aquatica.*



Large Tupelo.

Persimmon.

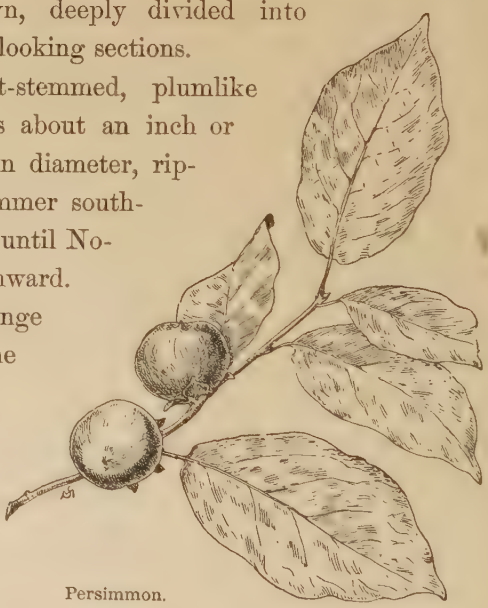
Diospyros Virginiana.

The persimmon, sometimes called date plum, is distinctively a Southern tree, although it may be found as far north as Long Island or southern Connecticut;* but only in the South will the tree be seen fully developed; here it grows, when unobstructed, 40 or 50 feet high, with widely spreading branches; in the forests it attains a height of 100 feet or more. The dark-green leaf is from two to five inches long, rather

* The specimen which I have sketched grows in Bucks County, Pa., and is over 40 feet in height.

thick, smooth and shining above, lighter colored and a trifle downy below; the ribs are greatly curved and irregular. The bark of the trunk is dark reddish brown, deeply divided into rather square-looking sections.

The short-stemmed, plumlike fruit, which is about an inch or a little more in diameter, ripens in mid-summer southward, but not until November northward. It is pale orange of a ruddy tone when fully ripe, and has a pleasant, sweet flavor after frost,* which seems necessary to render it edible. One rash bite of a persimmon before it has reached its fullest development



Persimmon.

* This, however, is a matter of opinion. There are those who insist that the fruit is best ripened *before* frost, for, although the latter removes the disagreeable astringency, it also destroys the flavor, particularly if the fruit has not reached a certain stage of maturity. In a half-dried condition a persimmon has the shriveled appearance of a raisin, and it tastes not unlike a date.

PERSIMMON TREE, BUCKS CO., PA.

From a photograph by Mr. N. Williams.

sets every tooth "on edge"; this remarkable astringency proceeds from the tannin it contains. The wood of the persimmon is close-grained, hard, and blackish in color; it is peculiarly adapted to carving. The *kaki*, or Japanese persimmon (*Diospyros kaki*), one of the principal fruit trees of Japan, is now planted in the Southern States, where it seems perfectly at home. It has a picturesque, contorted figure, large, leathery, shining leaves, and luscious fruit, which sometimes measures two inches in diameter.

Carolina Red Bay. *Persea Carolinensis, Persea Borbonia.*

The Carolina red bay, which grows, according to circumstances, 15 or even 70 feet high, is another Southern tree. It is found in the low grounds or swamps of Delaware and the South. Its leaves, two to five inches long, are downy when young, but soon grow smooth; they are evergreen. The flowers, which appear in summer, are inconspicuous, and of a greenish-white color. The berry, half an inch long, is dark blue with a red stem; it ripens in autumn.

Carolina Red Bay.

CHAPTER III.

I. Simple Alternate Leaves.

1. Without teeth. B. Edge divided.

THE TULIP TREE AND SASSAFRAS.

Tulip Tree—Whitewood.

Liriodendron tulipifera.

The tulip tree is also known as whitewood, but this name is commonly applied to the lumber. The wood, however, is far from *white;* it is rather dull greenish yellow, sparingly streaked here and there with dark or blackish brown. This tree is often a remarkable sight in May or June, with its countless greenish-yellow "tulips," touched inside with orange, which measure four or more inches across. The whole effect of color is worth study. It is as æsthetic and lovely as it is curious amid the plainer green of other trees.

The tulip tree attains a gigantic size in the South and West; it measures not infrequently 140 feet in height and eight feet in diameter; sometimes specimens are found which are 160 to 190 feet in height. The trunk often carries an almost uniform

Tulip tree.

diameter for forty feet upward, and when near the summit divides itself into strong, regularly disposed branches, which, with the far-reaching ones below, give the tree massive proportions and a truly magnificent appearance. As compared with the sugar maple, the foliage is not nearly so rich and dense, but superiority of size entitles it to the honor of being called a tree-giant.

The leaf is so peculiarly cut off at the end that one recognizes it at once; it is unique in shape, very smooth, thin, and it generally turns a russet color in the fall.* The seed pod expands (notice my sketch) into a charmingly decorative figure, which greatly adds to the beauty of the tree in autumn.

Whitewood is extensively used for interior finish, especially for paneling and moldings; it is so free from knots, and the grain is so straight, that carpenters prefer it to the best of white pine. It is also used in carriage building, as no other wood is quite so well adapted to the curved paneling which this work requires. The best growth of the tulip tree is found in the lower Wabash River Valley and on the western slopes of the Alleghany Mountains, but much of the lumber used in the Northeastern States is brought from Michigan and Wisconsin. The tree does not

* Sometimes it turns bright buff-yellow.

grow thickly anywhere, and it is seldom that one finds more than a few good-sized specimens on an acre of forest land.

There is, or used to be, a large tulip tree growing on the slope of Mount Mitchell, in North Carolina, not far from the spot where Prof. Mitchell lost his life. The trunk of this tree in 1866 measured thirty-three feet in circumference at three feet from the ground. There is a notable group of six beautiful trees, each one of which is over 50 feet high, near the Eastern Railroad station at East Saugus, Mass. On the eastern side of the town of Englewood, N. J., there is a small but most symmetrical specimen, which at the period of bloom is a domelike mass of soft, yellow-green flowers and leaves. I have never seen a tulip tree which equaled this one in form and color.

Sassafras.

Sassafras officinale, Sassafras sassafras.

Sassafras may be identified at once by its strongly aromatic taste; not only the root, bark, and twigs, but also the leaves, have a pungent flavor, reminding one of a certain kind of old-fashioned sugar candy. A decoction of the root and bark also contributes largely to the making of root beer. The tree, according to Gray, attains an altitude of 125 feet, and Prof. Apgar records its height as 100 feet.* This is a sur-

* *Vide* Trees of the Northern United States, Austin C. Apgar;

prise to many of us, who possibly have never seen a specimen which exceeded 40 feet. I have frequent-

Sassafras.

ly found sassafras in the vicinity of Lake Mahopac, Putnam County, N. Y., 10 or 15 feet high, and occasionally in New Jersey, perhaps 25 feet high; in the South, however, it commonly grows to a height

but in Silva of North America Prof. Sargent places the maximum height at 90 feet.

SASSAFRAS.

Windy Bush, Bucks Co., Penn.

of from 50 to 60 feet. Sassafras is found throughout the North and West, from eastern Massachusetts to Iowa, Kansas, and Indian Territory; southward it extends as far as central Florida, and from there to Texas.

The leaves have three distinct forms, each of which I have sketched; the texture is smooth, and rather thick. Although all parts of the tree are aromatic,* it will be found that the bark of the *roots* is bitingly strong, and from this the oil of sassafras is distilled; it is mostly made in Pennsylvania and Virginia. The bark of a young tree is a warm, buffish gray streaked with green; the twigs are shiny yellowish green. The fruit, which is ripe in September, is small, oval, one-seeded, bluish, and has a reddish, rather fleshy, club-shaped stem. The flowers are inconspicuous, greenish yellow, and appear in early spring with the developing leaves. I have never found the sassafras in the

Sassafras Leaf.

* The leaves furnish the flavoring used in gumbo soup.

White Mountains nor in any part of the country immediately south of them. There are two beautiful little trees, perhaps 12 feet high, in the Arnold Arboretum, of quite symmetrical proportions. On the 21st of October, 1895, I noticed that these trees had scarcely shed a dozen leaves apiece; but three days later (a heavy frost had intervened) not one leaf was left on either tree.* In Milton, Mass., there is a tree measuring over 40 feet in height, and in Manchester, Mass., near the center of the town, is another quite as high.

* The foliage of the sassafras, more than that of any other tree except the horse-chestnut, is conventional to a fault. One is impressed with the similarity between the leafage in an old print of Bewick's and that of the sassafras; both are regular and decorative.

CHAPTER IV.

I. Simple Alternate Leaves.

2. With teeth. A. Edge not divided.

THE LINDENS, ETC.

American Linden, or Basswood.
Tilia Americana.

The American linden, which sometimes grows under favorable circumstances 130 feet high, is best known by the name of basswood. In the northern part of New Hampshire it never seems to attain any considerable size. Most of the basswood which may be found in the White Mountains is half hidden among the shrubbery; but if one comes across a handsome, large, heart-shaped leaf with strongly marked veins and sharply pointed, irregular teeth, and with tiny tufts of rusty hairs on the back exactly at the junction of the veins, he may be pretty sure it belongs to this tree. If the irregularity of the toothed edge is examined, it will be seen that there is often a *regular* alternation of fine and coarse points; it would seem as though Nature had first edged the leaf with bold, sharp notches, and

afterward, not content with her handiwork, had interspersed the notches with a series of smaller and more delicate ones. The leaf is also characteristically veined; on either side over the two-scalloped

Basswood, American Linden.

(heart-shaped) base is a long vein, from which extend four or five branching ones with a backward curve. This peculiar veining will be more easily seen in my drawing of the European linden's leaf.

So far as the appearance of the leaves is concerned, there is very little difference between the American species and its foreign relative; but between the *trees* the difference is at once apparent.

European Linden.

The European linden (*Tilia Europæa*) is smaller, not often over 35 or 40 feet high;* its twigs are nu-

* The tree in Europe shows a very different record; for instance, the linden of Neustadt, on the Kocher in Würtemberg, was large enough in 1550 to require stone columns to support its

merous and slender, and its top usually tapers to quite a point. The American linden has a rounder figure, its small branches are heavier, its leaf is larger (four to six inches long), and it frequently attains a height of from 60 to 70 feet, with no branches below a point some sixteen feet above the ground. But these are superficial points of distinction; the botanical difference is found in the flowers. In the European variety there are no petal-like scales attached to the stamens. Our basswood is distinguished by a cream-colored, sweet-scented flower which *has* these scales.

Basswood is frequently used in cabinet work, and is a great favorite for the manufacture of wooden ware, as it is easily worked, and its grain is firm, white, and clear of knots.

The linden is common throughout the North, and it extends among the mountains as far south as Alabama. It is also found in Indian Territory and eastern Texas. It flowers in late spring, and in October its tiny fruit, like elongated brown peas, hangs suspended from a fine stem, half of which appears to be merged in a leaflike brown wing called a bract.

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enormous branches. In 1664 this tree had a trunk over thirty-seven feet in circumference, and was computed to be from eight hundred to one thousand years old.—*Scientific Papers, ii, 39, Asa Gray.*

Closely related to the tree just described is a small-leaved basswood (*Tilia pubescens*) not over forty feet high. In this species the leaves are usually two or three inches long; they are thin, rather hairy beneath, and the fruit "bract" is *rounded* at the base, not pointed or tapering as in *Tilia Americana*; the fruit is also rounder than that of other species. This tree is common from New York south and southwest.

American Linden Seed.

There is another native species of basswood, common in the mountains of Pennsylvania and in the South and Southwest as far as Tennessee, called white basswood (*Tilia heterophylla*). Its leaves are very large, sometimes seven inches long, smooth, oblique, deep, shiny green above, and silvery white and velvety beneath, with purplish veins. This tree grows to a height of from 50 to 60 feet. Although my drawings do not show any especial lopsidedness to the

Seed of Tilia pubescens.

linden leaf, it will be found that in many cases this irregularity is very pronounced; in the last-mentioned species it is particularly so.

American Holly. *Ilex opaca.* We have our own American holly, which is indeed a fine tree well worthy of cultivation, although, through the frequent absence of the scarlet berries, it has not the brilliancy of its English relative. It is not quite hardy a little north of 42° latitude. This holly grows from 15 to 50 feet high, has light brown-gray, smooth bark, and white flowers which appear in May.

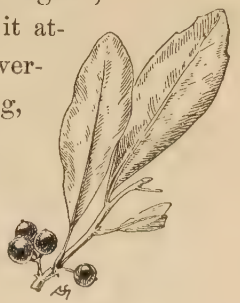
American Holly.

The evergreen leaf is rather thick and flat, has a wavy margin with scattered spiny teeth, and lacks the luster of that of the English holly. The tree will be found in moist woodlands near the coast from Quincy, Mass., to New Jersey, and southward to Florida; from southern Indiana it extends southward to the Gulf. The wood is very white,

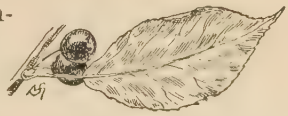
close-grained, and hard. The leaves are commonly used for decoration at Christmas time.

Dahoon Holly.
Ilex Dahoon.
Ilex Cassine.

The Dahoon holly is a small tree (frequently it appears in shrub form, not over 10 feet high) which grows in the pine barrens or swamps of Virginia, and from there southward; rarely it attains a height of 30 feet. The evergreen leaf is two or three inches long, with a curling margin toothed only at the end; sometimes it has no teeth at all, and what there are can not be called spiny. The berries are a varied red—less scarlet, perhaps, than those of *I. opaca*. The small branches and the veins on the under side of the leaf are somewhat downy. Another species of holly which often reaches the proportions of a tree, particularly on the slopes of the Alleghany Mountains, is called *Ilex monticola*; but this has light green deciduous leaves, and their shape is not hollylike; they are large, thin, smooth, and sharply toothed. The large red berry is borne on a short stem. *Ilex monticola* is common in the damp woods of the Ta-



Dahoon Holly.



Ilex Monticola.

conic and Catskill Mountains, and in Cattaraugus County, N. Y.; it also extends southward along the Alleghany Mountains to northern Alabama.

Carolina Buckthorn.

Rhamnus Caroliniana.

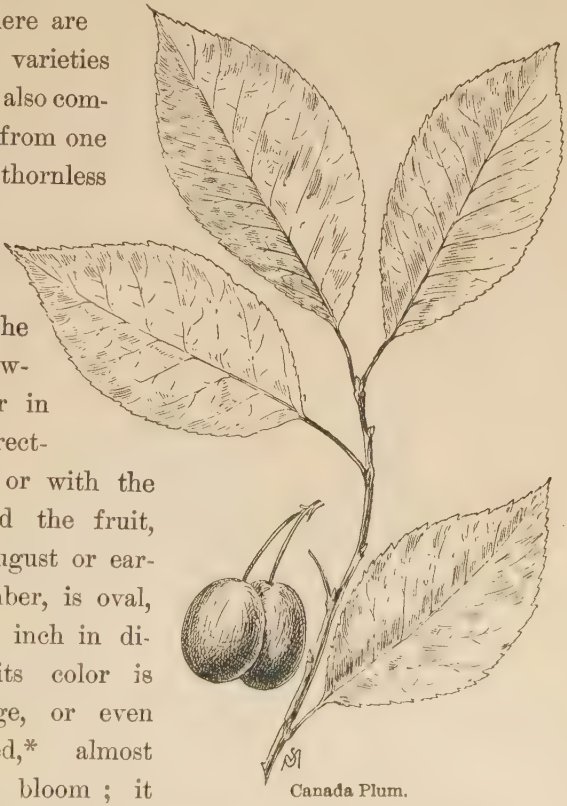
The Carolina buckthorn, or Indian cherry, is a thornless shrub or small tree which grows from 12 to 35 feet high. The somewhat elliptical leaves are from three to five inches long, wavy, indistinctly toothed, strongly veined, and nearly smooth, if one excepts the woolly stem. The globular, berrylike fruit, at first crimson, is finally black when ripe in September. The Indian cherry is found in wet grounds from Long Island, N. Y., and New Jersey to Kentucky, eastern Nebraska, and eastern Texas; southward it extends to Florida. In the Southern States it attains the height and proportions of a tree. The common buckthorn (*Rhamnus cathartica*) is a native of Europe; but Gray says it has run wild in a few places here, and in this condition is apt to form a small tree. The leaves are minutely toothed, and *sometimes they grow opposite*; the branchlets terminate in thorns, which fact distinguishes it at once from its American relative.

Carolina Buckthorn.

Wild or Canada Plum.

Prunus Americana.
Prunus nigra.

The wild plum, sometimes called Canada plum, is a rather thorny tree in its wild state, from 12 to 30 feet high. There are improved varieties which are also common, and from one of these thornless ones my sketch of the leaves is taken. The white flowers appear in spring, directly before or with the leaves, and the fruit, ripe in August or early September, is oval, about one inch in diameter ; its color is dull orange, or even orange - red,* almost free from bloom ; it



Canada Plum.

* The fruit from which my drawing was taken (from a tree in cultivation), when fully ripe, has a peculiarly luminous, æsthetic, *translucent red* color, which I greatly admire.

has a pleasant taste, although the skin is very tough and acid. The leaves are large, double-toothed, coarsely veined, and smooth without a gloss. The tree is common in woodlands and on river banks from west New England to Minnesota.*

Chickasaw Plum.

Chickasaw Plum.
Prunus Chicasa.
Prunus angustifolia.

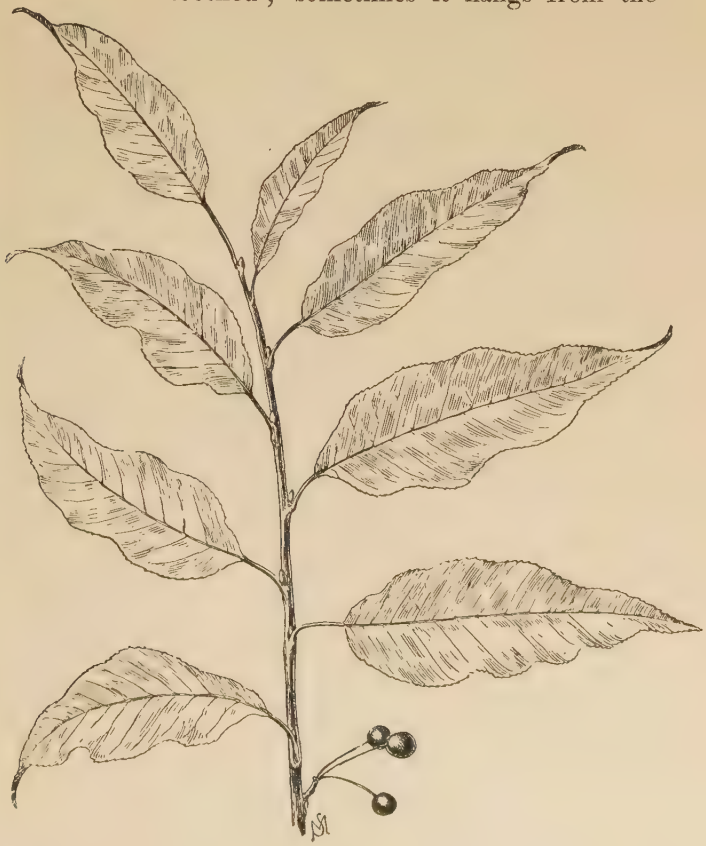
The Chickasaw plum has a long, lance-shaped, but broad leaf, with very fine teeth, a shining green surface, and a red stem. The fruit is one half to two thirds of an inch in diameter, globular, thin-skinned, of a lustrous reddish color, with a slight bloom, and is pleasantly flavored; it usually ripens in early summer. The tree is small, its average height being between 15 and 20 feet; rarely it attains 25 feet. It grows wild in Delaware, and extends westward and southward to Kansas, Texas, and Florida. It is widely cultivated.

Wild Red Cherry, or Bird Cherry.
Prunus Pennsylvanica.

The leaf of the wild red cherry, generally called bird cherry, is similar in shape to that of the Chickasaw plum, but its distinct peculiarity is a certain graceful, wavy outline, and a shining light green,

* The range of the Canada plum has been greatly extended through cultivation.

smooth surface; the margin is also finely and sharply toothed; sometimes it hangs from the



Red Cherry.

branchlets much in the fashion of a peach leaf. The flowers appear in early May. The tiny cherry, not

larger than a pea, is translucent red, and sour, but the birds seem to relish it.

This tree is common in rocky woods, where it often reaches the height of from 20 to 40 feet; but generally it will be found beside the highway often not much taller than the shrubbery among which it grows. Its twigs are red, and the bark of the trunk is dark chestnut-red, very smooth, rather shiny, and is covered more or less with rust-colored marks. Its tiny, white, long-stemmed flowers appear in May, scattered loosely over the branches, and contribute quite a graceful appearance to the otherwise slim and scrawny tree. The wild red cherry is common everywhere in the North, and extends southward along the mountains to North Carolina, and westward to Iowa.

Fruit of Black Cherry.

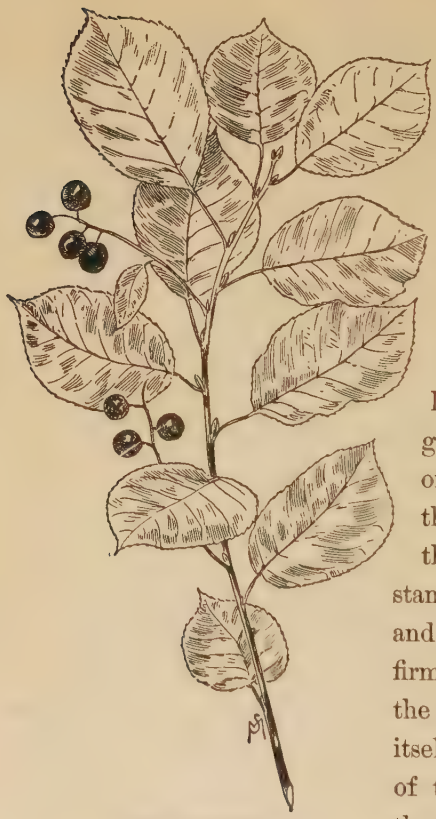
Wild Black Cherry. *Prunus serotina.* One of our most picturesque trees, which in perfect figure is more likely found on the confines of some field or on the bank of a river, is the wild black cherry. Here it is not hampered by the crowding growth of the forest, and it spreads itself over the

wide expanse of blue sky in bold and charmingly rugged outlines.

The tree is not symmetrical, and its foliage is not luxurious—on the contrary, it is rather thin; but in spite of this, the wild black cherry with its unconventional branches and its shining green leaves is a beautiful tree such as an artist likes to draw. Where other trees spread plumelike against the sky, a solid mass of green, the black cherry's topmost branches are penciled in dainty silhouette. This is one of the means by which I can identify the tree at a great distance. It is always in contrast with its surroundings.

We are so often attracted by *contrast* in natural landscape, that I am constrained to call attention to it as an indispensable accessory of beauty; in a word, without the thin foliage and unobstructed boughs of some of our less luxuriant trees, a landscape, especially if wooded, is heavy and monotonous. But we might look far before we would find the wild black cherry listed as a beautiful tree in the nurserymen's catalogues. Why? Well, I may explain at once that there are those whose sense of the beautiful is narrowed down to the confines of a single fact; for instance, a regularly proportioned tree with an orderly habit is considered beautiful; *that* is as far as some people allow imagination to go. That ruggedness, picturesqueness, contrastiveness, and boldness are

also elements of beauty, never occurs to the many who see the beauty of an American elm (who could not?), but who can not see the beauty of a wild black cherry.



Black Cherry (young).

But the tree is not only attractive in figure; both its leaf and fruit deserve a share of our attention. Notice in my sketch the vigorous way the leaves seem to have grown on the branch of the younger tree; there is a bluntness to their figure notwithstanding the sharp tip, and there is a certain firmness of purpose in the way each one spreads itself out from the side of the branchlet to catch the sun and rain; the very teeth are finely and firmly cut, and they are set close, as if to make a

bold stand against the elements. These leaves are in sharp contrast with those of the older cherry, and their whole aspect is indicative of youthful vigor. It is a curious fact, however, that the broad, blunt leaf (which is an exception to the general rule) of this younger black cherry is almost identical in shape with that of the choke cherry, *Prunus Virginiana;* this species is properly considered a shrub, although in a mild climate it sometimes attains the proportions of a good-sized tree. But this particular tree I describe which, with several others like it, grows in the valley of the Pemigewasset River, N. H., is unquestionably *Prunus serotina*, as a taste of the bitter almond-flavored bark proves its identity beyond a doubt.*

Typical leaf of the Black Cherry.

The long type of leaf, such as I have drawn just above, is most common in the wild black cherry. The flowers, unlike those of the red cherry, grow in clusters around a long, upright or *pendulous* stem, and appear in May or June. The fruit is

* I do not hesitate to introduce to the reader any leaf which I may come across, whether it be typical or not. One of the most interesting phases of the study of Nature is her essential unconventionality.

larger than a good-sized pea, and frequently has (if I may be allowed the expression) a "*broad-shouldered*" look; the skin is purple-black, and the pulp within is sweet, with a bitter, aromatic taste, accounted for by the presence of hydrocyanic acid * in the tree. One may notice the same taste in bitter almonds and peach stones. The bark is also bitter and aromatic, and is largely used as a tonic. "Cherry brandy" is made from the fruit. The tree grows from 50 to 100 feet high; its bark is a reddish brown,† marked with horizontal lines and rough excrescences. On old trees the bark is blackish brown, and on very young ones it is purplish or even greenish brown. The fruit is ripe in September (in New Hampshire), and the birds congregate on the boughs in great numbers to enjoy the boundless feast.

The wood of this cherry tree is very valuable in cabinet work; it is of a brownish pink tint, which is easily stained to the depth of color common in new mahogany (not Santo Domingo mahogany), and it is frequently used to imitate that wood. The wild black cherry is distributed from Maine southward to Florida, and westward to Minnesota, eastern Nebraska, and eastern Texas.

* More commonly called prussic acid.

† But southward, in Florida or the Gulf States, the color is light gray, *vide* Silva of North America.—*C. S. Sargent.*

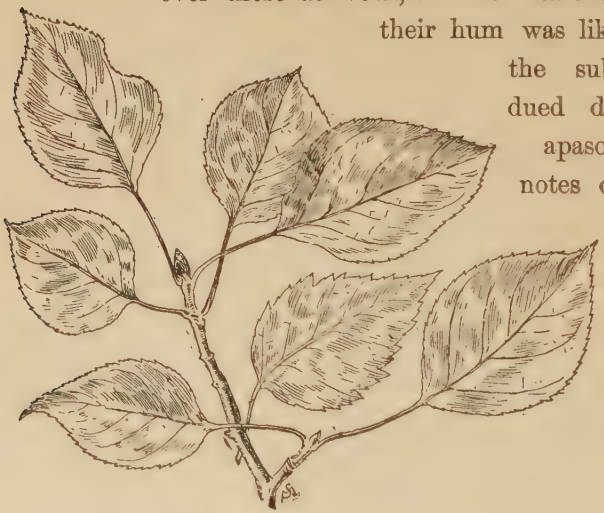
American Crab Apple.
Pyrus coronaria.

The American crab apple is a tree which I think is not fully appreciated—I mean, as a beautiful tree it is not planted enough in our parks and private grounds, and as a fruit tree it is too often displaced by some large-fruited apple. In one respect it ought not to be considered with the common apple at all. Its fruit makes a delicious preserve or jelly not to be mentioned in the same breath with plebeian "apple-sauce," as it possesses a pronounced and delicate flavor of its own.

The beautiful yellow-and-red fruit* in a good season burdens the crab apple beyond the strength of its supple boughs, and these must be braced up with stanch poles if the owner would not see his tree rent in sunder and its branches lying a mass of ruin on the lawn. I call to mind a beautiful tree with long, graceful branches extending clear to the ground, which in May is a magnificent, gigantic bouquet of large, fragrant pink blossoms, whose delicious perfume sometimes ladens the air fully three hundred feet away. What a sight for a Japanese artist, and what a treat for a Parisian perfumer! But they

* In the wild state the crab-apple fruit is greenish yellow. Some trees I know of in cultivation bear fruit more or less covered with a bloom, so the yellow-and-red color beneath is not brilliant until the plum-colored surface is rubbed off.

would not be alone in the appreciation of this crab apple. One morning I approached and stood beside it, drawn by an unaccountable musical hum which I had heard no less than seventy feet away. Wonder of wonders! I saw ten thousand golden bees busily engaged gathering honey from the countless blossoms, and yet another ten thousand bewilderingly circling over those at work, till the music of their hum was like the subdued diapason notes of



Crab Apple.

a grand organ. The bees at least do not overestimate the value of this tree. The crab apple's leaves are larger than those of most apple trees, and are not infrequently heart-shaped at the base. My drawing was taken from a tree in cultivation, but

the leaves in no wise differ from a type common to the wild tree, although the latter often shows a leaf with three notches on either side.* The fruit is about an inch and a quarter in diameter; the pulp is yellow, hard, and fit only for preserving. The tree grows from 15 to 30 feet high, and in its wild state extends from western New York westward to southern Minnesota, Kansas, and Texas, and along the mountains southward to Alabama.

Crab Apples.

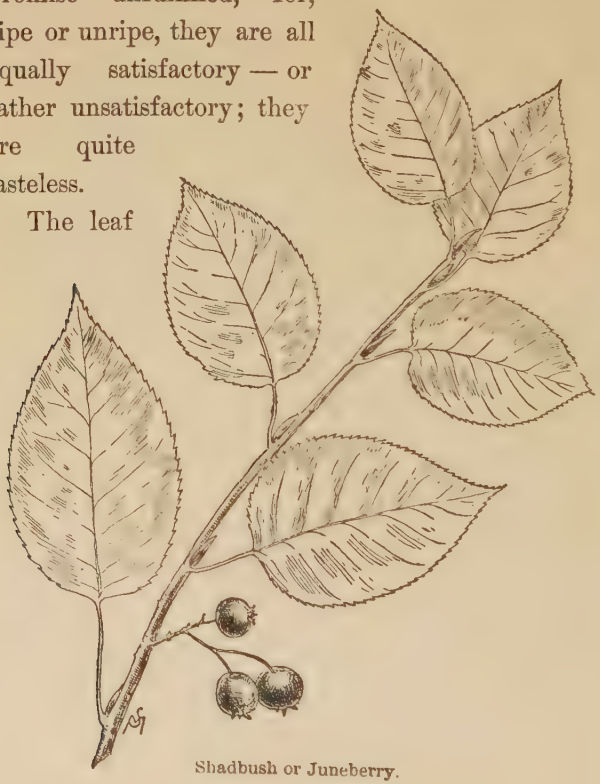
Shadbush, or Juneberry. *Amelanchier Canadensis.*

The beautiful shadbush, which most often is found in shrub form, frequently attains the proportions of a handsome tree 30 feet high. It is sometimes called Juneberry or service berry. The white flowers, with petals twice as long at least as they are wide, appear in advance of the leaves, and hang in loose, graceful clusters. The fruit looks something like a large huckleberry, with the same star-like indentation at the top, and a similar black-purple color.

The beauty of the berry lies in its diverse coloring. Sometimes we may find on one tree dull pink,

* For a somewhat similar leaf, see my drawing of the scarlet-fruited thorn.

crimson, magenta, and plum-purple as well as black-purple berries, which are in various stages of ripeness; but I may add that their appearance is as a promise unfulfilled, for, ripe or unripe, they are all equally satisfactory — or rather unsatisfactory; they are quite tasteless.



Shadbush or Juneberry.

The leaf is interesting if not exceedingly beautiful; it frequently varies from the pointed oval figure, which

was characteristic of the specimen which I have drawn, to an oblongish or square-shouldered shape. Its texture is hard and smooth, reminding one of leather; the teeth are extremely regular, sharp, fine, and the veins are delicate and regularly arranged; there are few leaves, in fact, that can compare with the perfection of form and structure which is apparent at a glance in the shadbush leaf. Did I say perfection? That was hardly the right word; *no* leaf is really perfect. To demonstrate this fact to our own satisfaction, we may begin what will prove a fruitless search for a specimen whose outline we may trace with a pencil, and then, reversing the leaf, find the drawing still in conformity with it. No, Nature does not trouble herself about that kind of perfection which may be measured with a foot rule.

The fruit of the shadbush is ripe in June and July; its flower is in bloom about the time the shad "run." The bark of the tree is smooth, and lavender-brown; less ruddy than that of black birch. I call to mind a certain tree at least 20 feet high growing wild on a river intervale among the White Mountains, which would be an ornament of striking beauty at its time of bloom in park or garden; but it remains a wild tree, which, like Thomas Gray's wild flower, was "born to blush unseen."

It would be well worth our while to search for

the shadbush in springtime and learn to love its beauty for its own sake; it is common in all the seaboard States, and extends westward to Minnesota and eastern Nebraska, and southwestward to Louisiana.

CHAPTER V.

I. Simple Alternate Leaves.

2. With teeth. A. Edge not divided.

THE WITCH-HAZEL, SORREL TREE, ELMS, ETC.

Witch-Hazel.
Hamamelis Virginiana.

The weird-looking witch-hazel, whose twigs are decorated in autumn with tiny tangled yellow blossoms, is a shrub rather than a tree, reaching a height, however, of fully 30 feet if it happens to grow under advantageous circumstances. In the woods of the White Mountains it rarely grows more than 12 feet high, but in the township of Campton I know of three handsome trees over 16 feet in height, each of which possesses only two or three stems; their appearance, in fact, is quite treelike.

The leaf of the witch-hazel, on an average two and a half inches long and nearly as broad, is rather roughly modeled; one side is larger than the other, their irregular teeth are coarse and wavy pointed, the

Witch-Hazel.

veins are straight and depressed, so that the leaf appears somewhat corrugated, and the surface is more or less covered (when young) with down. The flowers appear just as the leaves are turning from a dark green to a golden yellow spotted with brown and olive. If a single blossom is disentangled from the tousled but pretty little cluster of yellow flowers on the brown twigs, the figure with a little straightening out will look like my sketch at A. On these twigs also appear the twin seed-pods left from last year's flowers; these have a fashion of suddenly bursting when the seeds (polished little flattened brown pellets) are ripe, and ejecting their contents many yards away.* Thirty feet is no exaggerated estimate of the distance, although in my own experience I do not remember having seen a seed fly more than twelve feet. But Mr. William Hamilton Gibson has put the matter to a thorough test, so I quote what he says: "My experiments with the pods upon a long piazza and elsewhere proved that the momentum of the seed would commonly carry it to a distance of twenty feet, often over thirty feet, and in one or two instances the diminutive double-barreled howitzers succeeded in

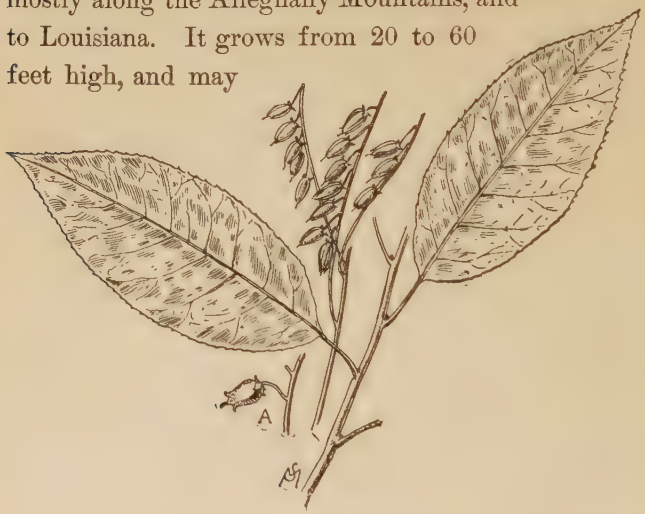
* "The seed is discharged by a contraction of the edges of the valves of bony endocarp" (inner lining of the seed-pod), "which in opening suddenly frees it by pressure and causes it to fly upward."—*Silva of North America, C. S. Sargent.*

propelling their missiles to the distance of forty-five feet by actual measurement."

The witch hazel is distributed from New England southward to Florida and Louisiana, and westward to eastern Minnesota.*

Sorrel Tree. *Oxydendrum arboreum.*

The sorrel tree is found from Pennsylvania to Indiana and central Tennessee, and southward to Florida, mostly along the Alleghany Mountains, and to Louisiana. It grows from 20 to 60 feet high, and may



Sorrel Tree, seed vessels, and flower at A.

easily be identified by its sour-tasting leaf, which in

* From the witch hazel an extract is manufactured possessing peculiar healing powers; it is generally known as "Pond's Extract." The discovery of the medicinal quality of the witch hazel

outline resembles that of a peach tree. Its white flowers appear in June or July; they are small, urn-shaped,* and are borne in loose, long, one-sided clusters. The leaves (five to seven inches long) are finely toothed, shining, smooth, and have very slender stems; they turn to a variety of brilliant reds in the fall. The sorrel tree is not a very distant relative of the kalmia and rhododendron; they all belong to the Heath family.

Slippery, or Red Elm. *Ulmus fulva.* The leaf of the slippery elm is about as coarse and rough as it could possibly be. This character does not show itself as distinctly in my drawing as I could wish, but the roughness is felt rather than seen; indeed, I think I could identify a branch of the tree quite easily with my eyes shut. Even the branchlets are rough, and in spring the soft and downy buds under a magnifying glass appear covered with innumerable rust-colored hairs. The upper side of the leaf under the glass also appears hairy, and the under side is a mass of soft down; the teeth are very coarse, and double, and the ribs beneath are prominent, stiff, and hairy at the angles. The leaf is much larger than that of the common elm; it measures from five to seven inches in length.

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is attributed to an Oneida Indian.— *Vide Shrubs of Northeastern America, Charles S. Newhall.*

* They somewhat resemble the wintergreen blossom.

Slippery Elm.

The tree grows from 30 to 60 feet high, and has an inner mucilaginous bark (whence it gets

the name "slippery elm"), which is possessed of demulcent and medicinal qualities. One may easily identify the tree by the gummy, aromatic taste of the bark on the branchlets. The wood is reddish, tough, and very durable; it is used by the farmers for fence posts, as it lasts a long time half buried in the ground. It is common from New England to the Dakotas and eastern Nebraska, and southward to Florida and Texas, but in the country immediately south of the White Mountains I notice that it rarely develops beyond the proportions of a small tree, with a trunk of about eight inches diameter.

The Scotch elm (*Ulmus montana*), sometimes called Wych elm, has similar but smaller and less rough leaves than the slippery elm; the buds are not downy, and the branches droop at their extremities. This tree is extensively cultivated, and will be found in many of our parks.

American, or White Elm. *Ulmus Americana.*

The American elm is justly famous as one of the most beautiful of all trees. It frequently grows from 60 to 80, and occasionally 120 feet high. One of our cities (New Haven), by reason of its beautiful elms, has been called the "Elm City," and many New England towns and villages—Greenfield, Deerfield, Andover, Concord, and a host of others—boast of

their elm-embowered streets, which are indeed beautiful, and typical of a New England town.

The most characteristic mark of beauty in the elm is the fringed appearance of its drooping branchlets, which hang suspended from the heavy boughs and trunk like so much lacework. The poet Whittier noticed this beauty, and alluded to it in his verses addressed to the Merrimac River:

> Laugh in thy plunges from fall to fall;
> Play with thy fringes of elms, and darken
> Under the shade of the mountain wall.

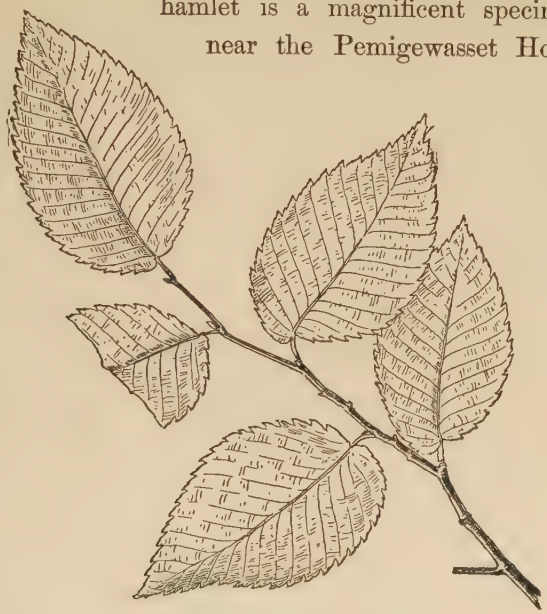
The arching character of the boughs which leave the trunk with an almost imperceptible curve outward, distinguishes this elm from all others, and gives it that singularly graceful figure which is best seen in isolation on the meadow, or in succession beside the road.

The leaf of the elm is rather harsh to the touch, and distinguished by its veiny, lopsided character, entirely different in every respect from a beech leaf;* the edge is most frequently, but not invariably, double-toothed.

The meadow land of the Connecticut River Val-

* I make a comparison of these two opposite types of leaves to draw particular attention to the difference in the character of foliage between the beech and the elm; no two trees could possibly be more *differently* graceful.

ley is famous for its grand elms; so is that adjoining Plymouth, N. H., and in this beautiful mountain hamlet is a magnificent specimen, near the Pemigewasset House,



American White Elm.

whose trunk four persons can scarcely encircle with outstretched arms and clasped hands. There are several "Washington" elms in various parts of the land, the most notable one of which is that at Cambridge, Mass.* The old elm which formerly stood on

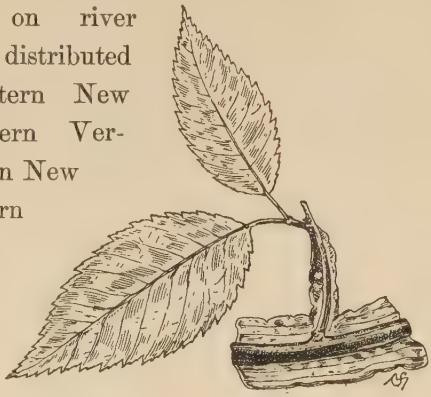
* Under this tree, which to-day has a rather dilapidated appearance, Washington took command of the American army, July 3, 1775.

Boston Common was cut down several years ago on account of its decayed condition. The wood of the elm is white, exceedingly tough and durable, and is used to make wheel-hubs, yokes, and saddle-trees; it is even beautiful when used in cabinet work, and has a rich, light yellow-brown color far superior to that of the birch. The tree is common in all parts of the country. The English elm (*Ulmus campestris*) has a leaf which is smaller and darker than that of our own elm, and it is not infrequently rough; its shape is also more abruptly sharp-pointed. The limbs of the English elm grow out from the trunk at a wide angle, and they are apt to give the tree an irregular outline with a larger upper and a smaller lower mass of foliage. There are numbers of fine old English elms on the Common in Boston; but few of them reach a height of over 50 feet.

Corky White Elm.

Corky White Elm. *Ulmus racemosa.* The corky white elm (80 to 100 feet high) resembles the white elm, with this very pronounced difference: its branches are marked

with large, corky ridges, and the twigs are somewhat downy. The leaves also have simpler and straighter veins. The tree is generally found on river banks, and is distributed through northwestern New Hampshire, southern Vermont, and northern New York to southeastern Missouri, and the southwest as far as central Tennessee. Another elm closely resembling the last is a small tree (40 to 50 feet high) called Wahoo, or winged elm (*Ulmus alata*). This variety is distinguished by corky ridges on either side of the branchlets, which are smooth, *not* downy. The leaf is very small (perhaps not over two inches long), downy beneath, thickish, and almost stemless. This species extends from southern Virginia southward to western Florida, and southwestward to Indian Territory and Texas.

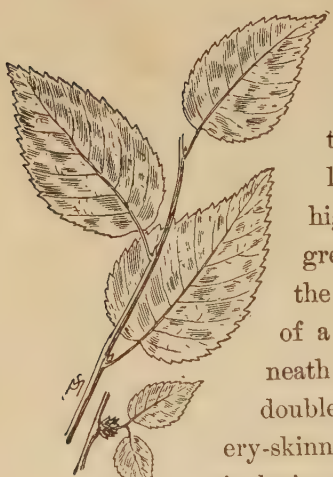


Wahoo or Winged Elm.

Planer Tree, or Water Elm.
Planera aquatica.

The water elm, or Planer tree, named for J. J. Planer, a German botanist, must not be confused with the greater

plane tree, frequently called buttonwood. This small tree, confined to wet banks beside ponds and rivers, is found in the valley of the Cape Fear River, N. C., in Kentucky, and in the South; westward it extends to southern Missouri. It rarely grows over 30 or 40 feet high, and has a small, dark-green leaf resembling that of the white elm, smooth above, and of a pale grayish-green color beneath; the teeth are sometimes double. The fruit is a rough, leathery-skinned nut about a quarter of an inch in diameter, altogether different from the elm's fruit, which is always winged; it is ripe in September. The bark of the tree is apt to scale off like that of the buttonwood.



Planer Tree.

Hackberry, or Sugarberry. *Celtis occidentalis.*

The hackberry, or sugarberry, usually is a small tree with the general appearance of an elm. It bears fruit about as large as bird-cherries, sweet to the taste, first yellowish and finally purplish red in color.* Its

* In midwinter the berries are dark mahogany-red. A handsome but small hackberry growing on a street in Cambridge,

deep-green leaves are variable in figure and texture; some of them are sparingly toothed, others are extremely oblique or lopsided, and a few are heart-shaped (scalloped) at the base; they are all conspicuously taper-pointed, and the teeth, extending over two thirds of the edge from the tip down, are sharp. The leaves are rarely over three inches long, and are generally rough to the touch.

Hackberry.

This tree is widely distributed; it is common from New England southward, and westward to Minnesota and even to Washington, on river banks and in the woods; it rarely reaches a height of over 20 feet, but in the South, and especially in the lower Ohio basin, it attains the proportions of a large tree, sometimes 130 feet high.

Red Mulberry. *Morus rubra.* The red mulberry grows variously from 15 to 70 feet high, and bears dark red, or, when finally ripe, black-purple ber-

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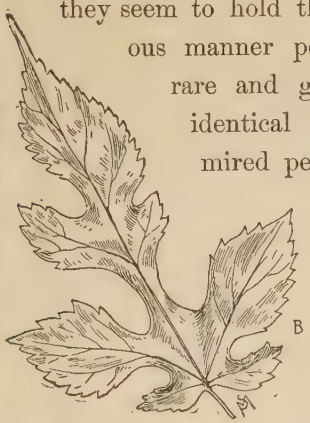
Mass., not far from the Harvard Botanical Gardens, is crowded with thousands of berries as late as the end of January.

Red Mulberry.

ries, resembling in shape and size long wild blackberries. The leaves, as one may see from my drawings, are extremely variable in figure; perhaps it may occasion some surprise when I say that these leaves which I have drawn all came off the same tree. This particular tree grows in the Pemigewasset Valley (White Mountains), just in front of an ideal farmhouse, and is not over 15 feet high; but it is extraordinarily beautiful both in roundness of figure and in brilliancy of foliage.

Nothing is more charming in color than the leaves of a young

mulberry tree in early summer; they are usually of a soft, warm, yellow-green hue, in agreeable contrast with the surrounding darker-leaved trees, and they seem to hold the afterglow in some mysterious manner peculiar to themselves. This rare and glowing yellow-green color is identical with that which we have admired perhaps in the garments of the Madonna in a picture called The Virgin Enthroned, by the American artist, Abbott H. Thayer. The red mulberry is common east of the Mississippi River, and in that locality reaches a height of 70 feet or more. It extends throughout the country.

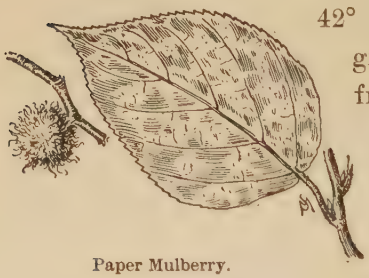


Cut-leaf of Red Mulberry.

There is also a white mulberry (*Morus alba*) with leaves similar to those of the red mulberry, except that they are smooth and shiny. This tree was introduced from China about 1830, and cultivated for the sake of its leaves, upon which silkworms delight to feed. The oval fruit is whitish, and at times purplish; it is edible, but has a rather sickening sweet taste. The tree is common throughout the North; southward it extends to Florida and Texas. I recollect a tall and handsome specimen at Palenville, N. Y.,

near the Catskill Mountains. The wood of the mulberry is yellowish, and durable in contact with the ground. The trees all have milky juice.

The black mulberry (*Morus nigra*), another native of Asia, has large, dull, dark-green leaves tapering into a sharp point, rather rough above, usually not lobed (divided), fine-toothed, and evenly balanced on either side of the stem. The fruit is large and sweet, purple-black in color, and double the size of the red mulberry; it is much esteemed in Europe. The tree, however, is rarely cultivated in this country, and it is barely hardy above 42° north latitude. It grows to a height of from 20 to 30 feet.



Paper Mulberry.

Paper Mulberry. *Broussonetia papyrifera.*

The paper mulberry is cultivated from New York southward as a shade tree; its leaves are very hairy above, downy beneath, round-toothed, and in young trees divided, but in old trees somewhat heart-shaped and *rarely* divided. The club-shaped fruit, ripe in August, is dark red, sweet, and insipid. The tree grows 25 feet or so high, with branches which hang low. It comes from Japan.

CHAPTER VI.

I. Simple Alternate Leaves.

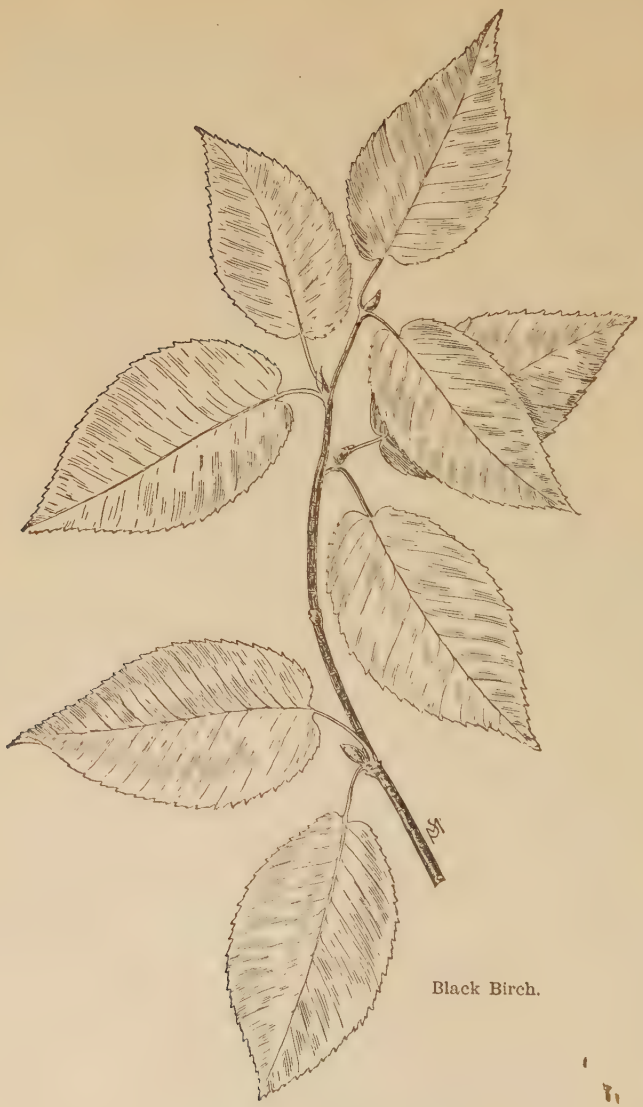
2. With teeth. A. Edge not divided.

THE BIRCHES.

Black, Sweet, or Cherry Birch.
Betula lenta.

The black, sweet, or cherry birch has slender, dark reddish-brown twigs with a delightful aromatic taste, which is a sufficient means for the unmistakable identification of the tree; the bark of no other birch possesses exactly this aromatic flavor, although there is a certain sweetness to the *yellow* birch's twigs. It is from the twigs of the black birch that the flavoring for birch beer is obtained.

This tree has an evenly balanced, oval-pointed leaf, with a regular double-toothed edge, which is an easy means of distinguishing it from its neighbors. Compare for an instant my leaf drawings of the black birch and the American elm: it will be seen at once that the leaves are somewhat similar in general outline, in double-toothed edge, and in prominent, almost



Black Birch.

conventional veining. But here the resemblance ends: the birch leaf is *shiny*, the elm leaf is not—on the contrary, it is rough; it also has a much more lop-sided figure. Furthermore, my drawing of the birch shows that the leaves grow in *pairs* alternately along the stem; the elm leaves grow singly; then, the little elongated dots on the tiny twigs of the birch, and the downy, short leaf stem, both of which bespeak the *Betula* tribe, are characteristics wholly unelmlike. There is also another distinguishing mark of the black-birch leaf: its base is unmistakably scalloped.* Now, compare this shape with that of the hop-hornbean leaf, and it will be seen that the scallop in the latter is extremely slight. These are minor differences, which, however, should not escape our notice.

I find the black birch in a shrublike condition in Campton, N. H., much more frequently than in tree form; but when it does reach the proportions of a tree it grows from 20 to 70 feet high, and carries a fairly straight trunk covered with a gray-brown bark somewhat resembling the cultivated cherry, but with those unmistakable horizontal marks which characterize the birches.

With the sunshine distributed over its brilliant

* The botanical expression for this scalloped base is "cordate" or "heart-shaped"; but I refrain from using a term which might mislead one to believe the *entire* leaf was shaped like a heart.

green leaves this tree makes a fine show in an open space where there is no interference with its vigorous growth. Its wood is reddish brown, fine grained, and is well adapted to cabinet work. As a matter of fact, it is often stained to imitate mahogany, and so treated one is completely deceived as to the true nature of the wood. Its bark does not separate into thin layers, like that of the paper birch.

Yellow Birch.
Betula lutea.

The yellow birch gets its name from its yellowish trunk; there is really little yellow in it, but enough, perhaps, to justify the name; more exactly, I should describe the color as silvery yellow-gray. Again, those horizontal marks which characterize the *Betula* family are sprinkled over the delicate, silvery bark; notice, also, the way this thin bark is curled and frizzled away from the trunk; it ornaments the latter with a thousand shining edges, which catch and hold the scattered, flickering sunlight of the woods so that the tree is distinctly separated from its stalwart, dull-hued, rough-seamed neighbors. Indeed, the yellow birch possesses a certain unmistakable femininity of character which is suggestive of some tattered and dishevelled woodland nymph. A young sapling about three quarters of an inch in diameter, whose silvery-yellow bark is in perfect condition, makes a beautiful cane when tastefully mounted. There are few trees which, like the yellow

Yellow Birch.

birch, may boast of bark with a texture like satin and a sheen like silver.

This yellow birch is so closely allied to the black birch that I must point out the differences which we may observe in their leaves. The yellow-birch leaf is rather coarser in texture and toothed edge; it is not so conventional in figure as that of the black birch; it is often quite contracted at the scalloped base, which is not so decidedly formed; its leaf stem is exceedingly downy, also the back of the leaf, especially over the veins; and, lastly, it does not possess the shiny, bright-green color which characterizes the black birch. Besides these leaf differences there are others: the catkin is less long and more egg-shaped, and its scales are larger and thinner; but the fact that the yellow birch has unmistakably *yellow* bark prevents the possibility of confusion with any other of the species. The tree attains a height of 80 or 90 feet if it is placed in advantageous circumstances; I know of a specimen over 75 feet high near Livermore Falls, Plymouth, N. H. The wood is white, and not very useful except as fuel.

White or Gray Birch.
Betula populifolia.

The common white birch, sometimes called gray birch, is an American tree of which we may well be proud. I think it possesses a feminine grace and charm which are as yet unappreciated by those who seek after

ornamental trees with which to decorate parks and private grounds. Its long, thin branches as they extend outward from the white trunk droop in many a subtile curve; the ends are divided into an infinite number of dark-brown, wiry branchlets from which depend the beautifully formed leaves. These are somewhat triangular in shape, taper to a sharp point, and are bright, shiny green; in fact, no other tree possesses so brilliant a leaf. In spring the tree is bright yellow-green, and furnishes a striking contrast with any evergreen which may happen to be in its vicinity.

The extreme lightness and airiness which characterize this birch are the qualifications which assist one most in its identification. If, for instance, I see in the distance a small tree with white trunk, thin, light yellow-green foliage, and dark, wiry branches disposed to droop (the topmost ones are decidedly vertical), I know pretty well by experience that no other native tree except the gray birch answers to that description; in a park it might possibly be confused with its foreign relations, but in the forest it is unique. Unfortunately, the beauty of the gray birch never shows itself to advantage in its native environment; in the struggle for existence among its crowded neighbors, much of its femininity and daintiness is completely lost; its symmetry is im-

White or Gray Birch.

paired, its outlines are scrawny, and its strength is lost in the effort to elbow its way above encroaching companions of a more vigorous growth. But place the tree where it has a chance to do its best, and it will develop into astonishingly graceful proportions.

This birch, is distinguished from its near relatives, by several marked characteristics. Notice the bough where it joins the white trunk; this triangular brown patch below the branch is always present in any tree of any age. The leaf stem is slender, rather long, and not downy; the leaf (often growing, as in my sketch, in pairs) is very smooth and shiny on both sides; also, the stem being slender the leaf shakes with the slightest breeze, and its varnished surface, reflecting the sunlight, breaks it into shifting, sparkling green fire. This is no exaggeration of the truth. Watch some tree on the edge of a dark wood on a clear day in early June, when Zephyr is at play among its branches, and the flashes of green light which come and go will fairly dazzle the eyes.

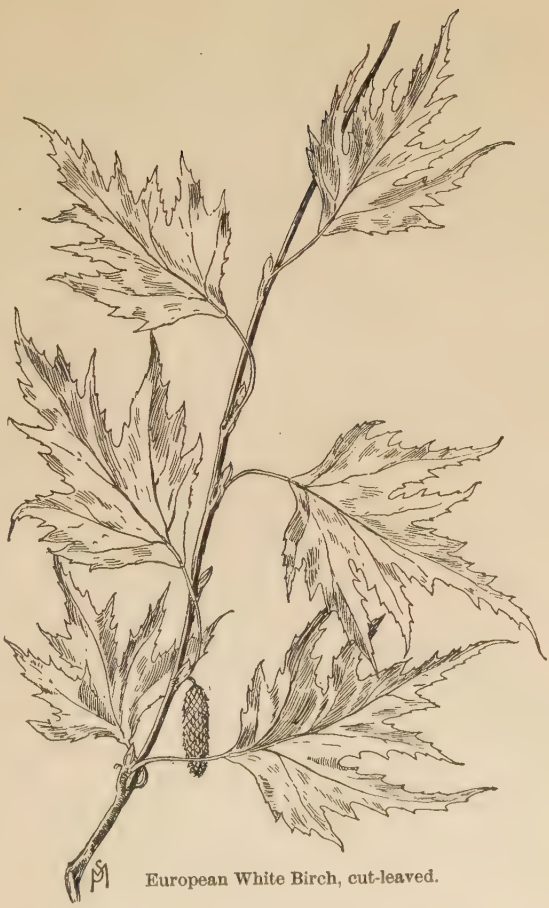
The white bark is not easily separable into layers, and it lacks that freedom from knotty imperfections which makes the canoe or paper birch so dazzlingly white in broad sunlight. Often in very young trees the bark runs through dark brown to tan color, and only the thickest part of the trunk is sparingly white; but through all the branches and over the trunk are

the same lines and dots which always mark the *Betula* tribe. The tree is small, rarely reaching a height of more than 30 feet. Its wood is white, soft, and is used mostly for fuel; rarely it is made into spools such as are common in the weaving mills of New England.

European White Birch.
Betula alba.

For the sake of comparison, I introduce here a sketch of the European white birch. This foreign relative of our *Betula populifolia*, which is indeed closely allied to our tree, is certainly very beautiful, and is becoming quite common in cultivation. The specimen which I have sketched was taken from a tree which was planted in front of a private residence in Plymouth, N. H.* It is a cut-leaved variety of the European birch, specifically named *Betula alba*, var. *laciniata*. But when I admit its beauty (possibly some landscape gardener may lift his eyebrows at the word *admit*), I must remind those who have studiously observed our own gray birch that its European relative does not possess the power of flashing that jewel-like green light to which I have drawn attention. In a word, the foreign tree possesses a beautifully shaped leaf, without the splendid lively color of its American relative. These ornamentally

* This beautiful tree, some 30 feet in height, stands near the gateway entering the grounds of Dr. Robert Burns. On these grounds are also several rare trees of various foreign species.



European White Birch, cut-leaved.

slashed leaves (John Ruskin would call them *rent*) are rather a dark green, and they are not very

shiny—in fact, they are not constituted as sunlight flashers.

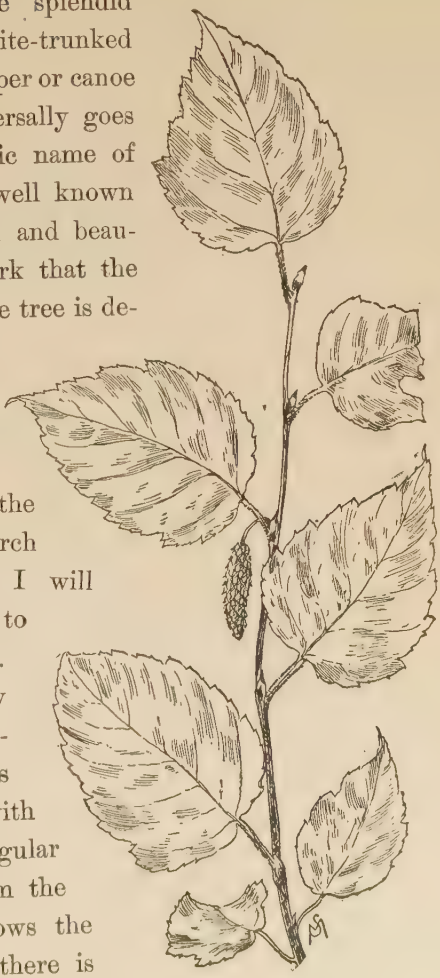
This makes a vast difference with the appearance of a tree, supposing, of course, we take into consideration its effect under conditions of light and shade. I could identify our gray birch at a great distance in the focus of strong sunlight gathered from a cloud-rent; such a thing would hardly be possible with any other tree. The European birch under similar conditions would appear at best commonplace, if, indeed, it was recognizable at all. Then, also, in early October, when our own birch is transformed into pale, shining gold, there is hardly a suggestion of gold in its European relative. I have seen both trees together under the same climatic conditions, and the change of color in the foreign tree was not comparable with that of its American relative. My drawing is sufficient for the identification of this particular European birch.

The different kinds of European birch (*Betula alba*) are; var. *pubescens*, leaf covered with white hairs; var. *pendula*, weeping; var. *laciniata*, cut-leaved; var. *fastigiata*, pyramidal; and var. *atro-purpurea*, purple-leaved. These are all to be met with in parks and private grounds, but as yet I think none of them have escaped from cultivation.

Paper, Canoe, or White Birch.
Betula papyrifera.

The splendid white-trunked paper or canoe birch, which universally goes by the less specific name of white birch, is so well known through its useful and beautiful paperlike bark that the identification of the tree is dependent on no other means. But lest it should be confused with its near relative, the gray or white birch (*B. populifolia*), I will draw attention to certain differences.

Unlike the gray birch, the extremely white bark is scarcely marked with a distinct triangular brown patch, from the top of which grows the branch; indeed, there is hardly any brown at all



Paper or Canoe Birch.

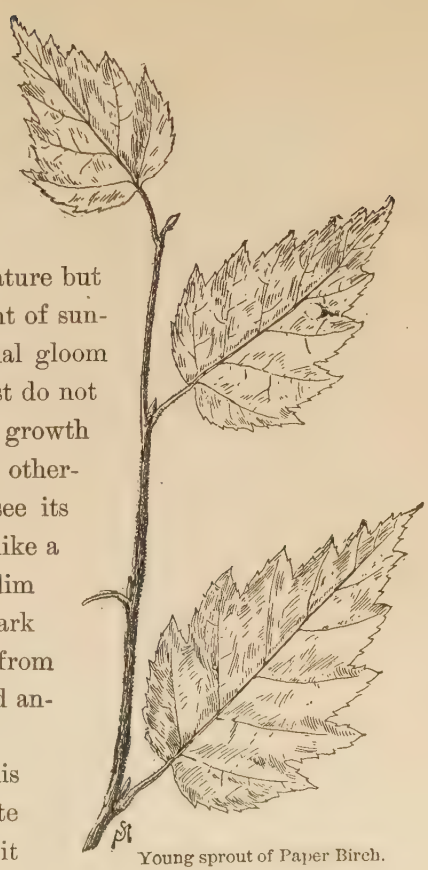
below the branch; in the gray birch it is never absent. The bark on a large tree will hold broad spaces unfurrowed by knotty imperfections. The paperlike layers of the bark are easily separated into numerous thin sheets, varying from a buffish cream color to a light tan, the lightest color belonging to the outermost layers. The leaf is altogether unlike that of the gray birch; its stem is short and often very downy (notice in my drawing that the stems are short, thick, and not sharp or clean looking); its outline is oval, with a moderate point, and the teeth are coarsely irregular; in color it is dull green, smooth above and hairy below, especially on the ribs and at their angles; at the base it is oftenest rounded, but now and then it is remotely heart-shaped.

The branches have no tendency to droop, as do those of the gray birch, and the whole color effect of the tree is darker. It is also a tall variety of the Birch family, sometimes reaching a height of 75 feet. The beauty of the white-trunked tree in the Northern forests can scarcely be overestimated; it is one of those woodland characters which does not seem to lose anything by the overcrowding process. I have seen great, handsome specimens in the dense woods of the White Mountains, undespoiled of their virgin white bark by the hands of tourists, growing straight up in the air and sending out widespreading branches

WHITE OR PAPER BIRCH.

Campton, Grafton Co., N. H

as if there were no forest in the way and room was not scarce, for their topmost boughs quite overspread in *radius* two other comrades of lesser stature but denser growth. Want of sunlight and the perpetual gloom of the primitive forest do not seriously retard the growth of the paper birch, otherwise we could not see its vigorous stem stand like a white giant in the dim distance of the dark woods as we look from one mountain toward another.



Young sprout of Paper Birch.

The wood of this birch is buffish white and close-grained; it makes a splendid hard floor, and for interior finish has no equal among the plainer kinds of ornamental wood. It makes an excellent fuel, although it is quickly consumed. In

the woods it is subject to rapid decay, and frequently one may meet with an old fallen specimen, apparently sound if one judges by the look of the bark, but really rotten to the core. The bark is waterproof, and is used by the Indians and the Northwestern hunters for the construction of canoes, the seams of which are neatly sewed together and made water-tight by the use of pitch.

There are often great variations from the typical forms of tree leaves. I have drawn one of these variations, which may commonly be noticed in the seedling paper birch. The specimen shows a strongly double-toothed leaf, whose whole character—stem and surface—was downy. The back of the leaf was particularly hairy, as well as the twig, which was something of an old gold color, characterized by the usual dots of the *Betula* family. The leaf was soft to the touch, and on the under side the veins were white, with rather rusty-looking hairs. My drawing was taken from a young shoot.

Red or River Birch. *Betula nigra.*

The red birch, sometimes called river birch, is rather a Southern variety, seen at its best south of Baltimore. The leaf at the edge is very unevenly double-toothed, and its aspect is alderlike. The outline is angularly egg-shaped, and the stem is short (about half an inch long) and downy. The whole leaf has a whitish-

green look on the under side, caused by the soft, downy growth over its surface; the upper side is a medium green, not so bright as that of the gray birch. The branches are dark brown, the smaller ones often ochre or cinnamon color, and always downy when young. The bark of the trunk is dark red-brown, and often hangs in shreds of a lighter brown

Red Birch.

hue; but the trunk never has quite the disheveled appearance common to the yellow birch, although the thin bark often hangs and curls about the body of the tree in the same charming, disorderly fashion. Perhaps the best way to identify this birch is by the peculiarly irregular leaf; its rude outline resembles the alder, but at once the lines and dots on the trunk and branches show the birch character. The red birch is common in New Jersey and in Bucks County, Pa. One need not look for the tree north of Massa-

chusetts, as it belongs in its wild state southward, and westward as far as Minnesota. It grows beside the banks of streams, and attains a height of 30 to 50 feet. It is the only birch which can be found in a warm climate. Unfortunately, the botanical name indicates that it is black; really it should be called *B. rubra*, and there *is* one authority for this name.*

I can not leave the birches without calling attention to an extreme species, a shrub rather than a tree, which shows how far Nature sometimes deviates from her commonest types. *B. glandulosa* is a dwarf variety of the birch, with miniature leaves and stunted stems, which is found among the high mountains of New England. My sketch is taken from a specimen found on the Presidential Range of the White Mountains, between Mounts Adams and Jefferson; it grew close to the ground, hugging the rocky foundations, and the smooth, brown branches were conspicuously dotted with resinous, wartlike glands, to use Gray's own words. The bush grows from 1 to 4 feet high. The leaf is scarcely over three quarters of an inch long.

Dwarf Birch.

* Michaux.

CHAPTER VII.

I. Simple Alternate Leaves.

2. With teeth. A. Edge not divided.

THE ALDER, ETC.

Speckled or Hoary Alder.
Alnus incana.

THE speckled or hoary alder, properly speaking, is a shrub; yet it often grows 20 feet high, and sometimes has one substantial trunk. There is scarcely a brook or streamlet passing through the White Mountain region which is not shaded by the very dark olive-green foliage of the speckled alder, and I call to mind mile after mile of valley road edged by this beautiful bushy tree; indeed, it might justly be called the "roadside genius" of sylvan New Hampshire. I think the "speckled beauty" of the woods, although he does not seem to know it, owes this alder an enormous debt of gratitude for hiding his cool and pebbly retreat and entangling the angler's "fly." Whoever has fished in a mountain stream has

unwillingly formed more than a "scraping acquaintance" with this tree—the brook trout's best friend.

Speckled Alder.

Its leaves are extremely coarse, irregularly toothed, prominently brown-veined, very downy beneath (especially when young), and dull, dark olive above. The bark of the twigs is also olive-green, and that of the trunk is shiny, ruddy green. The purple and yellow catkin which appears in spring is extremely graceful, and scatters clouds of pollen dust if disturbed. In the fall we will find the catkin buds and the "cones" on the same bush, like my sketch. The cones resemble red-pine cones in miniature.

The European alder (*Alnus glutinosa*), often planted in our parks, is a handsome tree from 25 to 60 feet in height, with a leaf closely resembling that

of the speckled alder, abruptly pointed, and wavy at the fine-toothed edge; there is a tuft of down at the angles of the veins beneath. The younger branches and the stems of the leaves are usually glutinous. Several forms of the tree are cut-leaved.

Hop Hornbeam. Ironwood.

Ostrya Virginica.
Ostrya Virginiana.

The hop hornbeam, sometimes called ironwood, is a slender tree with exceedingly hard wood, which is used in making cogs for mill-wheels, teeth for wooden rakes, mallets, axe handles, cart pins, and other farming implements which must possess extra strength. Its leaf is beautifully formed, exquisitely sharp-toothed, and has a somewhat dull, light-green color; a stem scarcely a quarter of an inch long joins it with the slender twig, from which it grows out horizontally. A comparison of this leaf with that of the black birch reveals a certain similarity; the great difference, however, lies in the *texture:* the hornbeam's leaf has a rough finish, and the birch leaf shines; furthermore, it has a stem fully three quarters of an inch long.

The bark of the trunk is finely furrowed in perpendicular lengths of four inches, rarely more. The young shoots are olive-green of a ruddy tone dotted with dark brown. The fruit, as one may see by my drawing, greatly resembles the hop; it appears in August or September. The tree rarely grows over

Hop Hornbeam.

35 feet high, and has light, slender branches; these, when covered with thick foliage and the hoplike fruit, are extremely graceful.

Hornbeam, or Water Beech.

Carpinus Caroliniana.

The hornbeam, which is also called blue or water beech, is common on the banks of streams from New England to Minnesota and southward. It may be distinguished from the hop hornbeam by its little three-pointed leaflet or bract, which is placed in pairs base to base with the small nuts; these leaflets form an *elongated cluster*, which remains hanging on the tree until late in the autumn. The leaf stem is about *half* an inch long, and the leaf itself, fuzzy when young but soon nearly smooth, resembles that of the hop hornbeam, except that it is rather unevenly toothed.

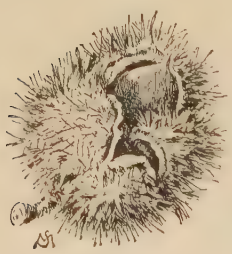
Hornbeam.

The bark of this tree is gray, smooth, and not unlike that of the beech, although it has in addition occasional ridges which mark the trunk perpendicularly. The wood is very hard, and whitish. The water beech is a slow grower, and rarely attains a height of over 20 feet, except in the South among the Alleghanies. In the mountains of New Hampshire it is quite absent.

Chestnut.
Castanea sativa.
Castanea dentata.

The chestnut is so familiar to every one who lives in or near one of our great cities, in whose vicinity it is pretty sure to be planted, that a description of the tree seems wholly unnecessary for its identification. Yet there are a few interesting facts about the luxuriant chestnut which we would do well to remember.

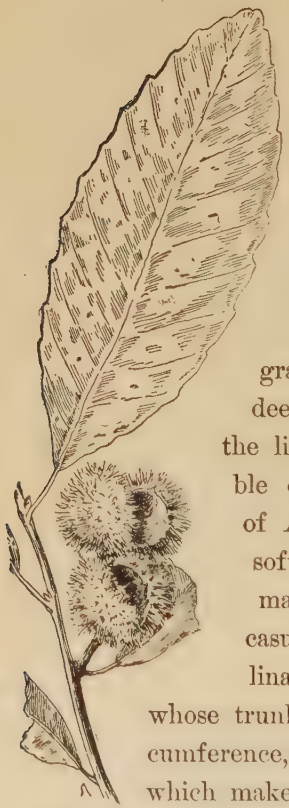
It is certainly a most extraordinary, rapid-growing tree, which in *giving* is only rivaled by the sugar maple. At five years of age it will actually bear fruit; in fifteen years' time it is valuable as timber, and if cut down then its shoots, which grow even more rapidly than seedlings, develop into fine trees within another ten years. An orchard of chestnuts will bring its owner larger returns than many an apple orchard of the same size. The fruit is brought into our cities in autumn by thousands of bushels, and sold at *retail* in the stores and on the corners of busy streets at the rate of about six dollars per bushel. Indeed, the Italian who sells his tiny measure of roasted chestnuts for five cents brings the average nearer eight dollars per bushel. In Iowa certain orchards planted eight-



Chestnut Fruit.

Chestnut.

een years ago are bringing in their owners better returns than the same acreage in farm products.



Chinquapin.

The chestnut has a very dark green leaf of a decidedly rugged character; its teeth are like those of a circular saw, and its ribs give it a somewhat corrugated surface, which I have tried to portray in my sketch. The tree grows from 50 to 80 feet high, has very coarse grayish bark, and its luxuriant deep-green foliage, crowned with the light rusty tinge of innumerable developing burs in the month of August, forms a color effect so soft and beautiful that it commands the admiration of the most casual observer. In North Carolina there are many specimens whose trunks measure sixteen feet in circumference, so it is not always a fine leaf which makes a beautiful tree. The wood is useful and durable, rather soft, yellowish, and has a coarse but handsome grain, which is at once apparent in the gilding of many a picture frame.

CHESTNUT.

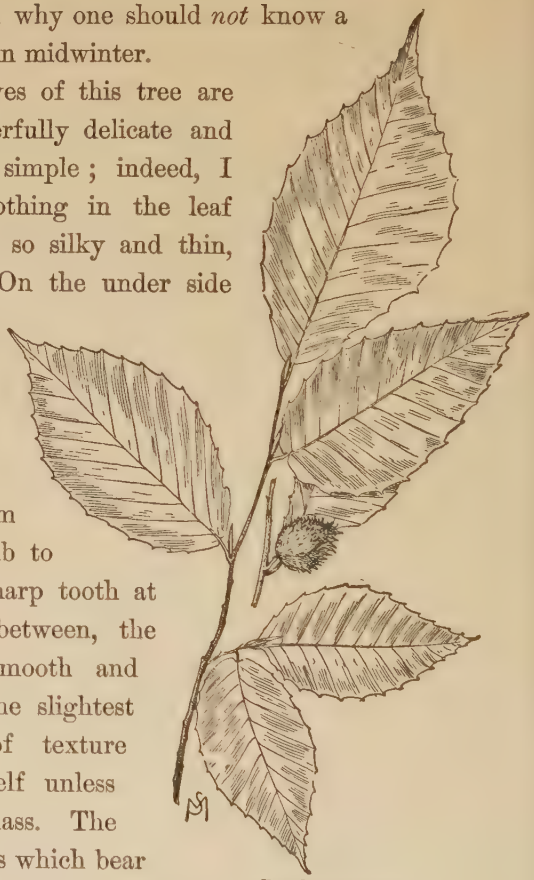
Upper Solburg, Bucks Co., Penn.

Chinquapin. *Castanea pumila.* The chinquapin is a small variety of the chestnut, common in the South, which grows from 7 to 35 feet high. The bur, about an inch wide, bears a single small nut rounder than a chestnut. The leaf is like that of the chestnut, but has a downy or woolly appearance beneath, is usually less distinctly toothed, and is seldom over five inches long. The tree grows wild in southern New Jersey, Pennsylvania, Ohio, and southward. Its foliage is whitish olive-green.

Beech. *Fagus ferruginea.* *Fagus Americana.* The beech tree is common in all our woods North and South; it extends westward to Missouri and southward to Florida and Texas, and attains its finest growth in the southern Mississippi River Valley. In the middle of winter, when the forest is bare of leaves, we ought to be able to recognize the beech at a glance: no other tree has the same smooth, light gray, spotty bark; no other the same smooth, roundish curves on long, low branches which extend horizontally a good distance from the trunk. The bark of trees may easily be grouped under three classes: first, perpendicularly ridged; second, horizontally striped; and, third, round spotted. To the first class belong a great number of trees, including the elms; to the second belongs the birch; and to the third belongs the beech, almost alone. I think, then, there

is no reason why one should *not* know a beech even in midwinter.

The leaves of this tree are most wonderfully delicate and charmingly simple; indeed, I know of nothing in the leaf world quite so silky and thin, yet firm. On the under side of a beech leaf the delicate, whitish, wiry veins run straight from the center rib to the small sharp tooth at the edge; between, the surface is smooth and green, not the slightest indication of texture showing itself unless one uses a glass. The slender twigs which bear the leaves spread out horizontally, not droopingly like elm leaves, are also a marvel of delicacy. The tiny three-cornered nut incased in the miniature bur is familiar to every Amer-



Beech and Fruit.

ican boy, and needs no praise here. The tree often grows to a height of 100 feet in the South; northward it is commonly 50 feet high. In the early autumn it is particularly beautiful; all its leaves turn an even, clear, pale golden yellow, which seems on a sunny day to diffuse a strange radiance in its immediate vicinity. With my eyes closed I have been sensible of the peculiar light reflected from the tree in its yellow dress. There is no prettier combination of color than that of the golden leaves and white-spotted gray and greenish trunk. The wood is very hard, close-grained, and is used for making chairs, loom spools, shoe lasts, and milking stools. The tree is so strikingly beautiful in its winter aspect that it has become a favorite subject with several well-known artists; Mr. W. L. Palmer, in particular, delights to portray its picturesque and stolid gray trunk casting blue shadows over the sunlit snow. It has been well named "the painted beech," for no other tree has a trunk so attractively painted by Nature.

The European beech (*Fagus sylvatica*), occasionally planted in our parks, is the tree, I believe, which is indirectly responsible for the downfall of Macbeth. It was not the Birnam beeches* which cost

* The old forest, Birnam Wood, has long since disappeared, and in its place is a meager young growth scarcely deserving the name.

him his life, but something very nearly related to them—spears! The leaf of this tree resembles that of its American relative, but it is broader, shorter, and in many varieties it is wavy, without teeth; in others it is deeply cut at the margin. The purple or copper beech (var. *atropurpurea*)* is a variety with a rounded figure, very dark copper-colored foliage, and somewhat curved leaves sparsely toothed. There are several handsome specimens in the Public Garden, Boston. The tree is very slow in unfolding its leaves, and it is extremely loath to part with them; for that matter, the beeches often hold their faded, ghostly, brown-white leaves throughout the winter.

* The latest name for the copper beech is *Fagus sylvatica foliis atrorubentibus.*

CHAPTER VIII.

I. Simple Alternate Leaves.

2. With teeth. A. Edge not divided.

THE WILLOWS.

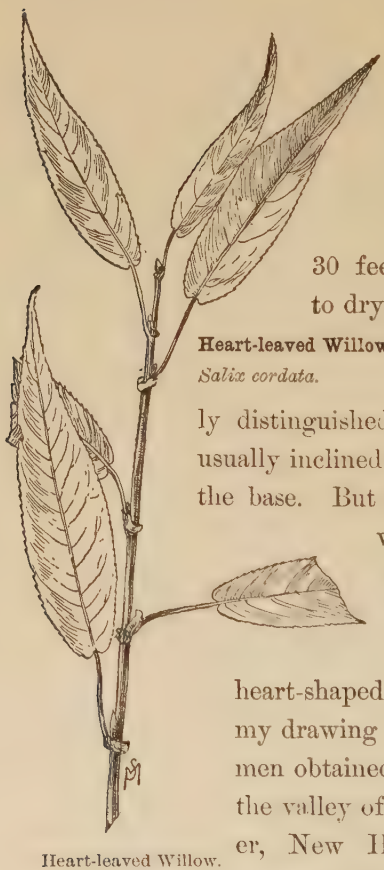
Goat Willow.
Salix Caprea.

MANY of the willows, more especially those under cultivation, have become so greatly mixed that it is not easy to discriminate between them.* One of the most troublesome ones in this respect—the goat willow—comes from Europe, but it is very frequently seen in cultivation in this country. It furnishes the stock or the foundation, so to speak, for that beautiful umbrella-shaped tree which is known in our parks and gardens as the Kilmarnock willow, of a "weeping" form. But this willow may at once be distinguished by its *roundish* leaf; it is oval or long-oval in shape, thick, deep green above

* It is a singular fact that many willows must be grafted on other species quite a distance above the root, otherwise they never attain any considerable height—that is, if planted in the shape of cuttings.

and rather soft-downy below. The catkins, which are bright yellow, appear in early spring long before the leaves.

The goat willow has brown or reddish-brown branches, and grows not over 30 feet high. It is adapted to dry situations.



Heart-leaved Willow.

Heart-leaved Willow. *Salix cordata.*

The heart-leaved willow may also be easily distinguished by its leaf, which is usually inclined to a scalloped form at the base. But Gray says this is a most widely distributed and variable species with an inappropriate name, as its leaves are seldom heart-shaped at the base. However, my drawing was made from a specimen obtained at the side of a road in the valley of the Pemigewasset River, New Hampshire, and having compared it with another specimen which grew in southern New York, I found the differences wholly insignificant. A distinguishing

characteristic of the leaf of this tree is the conspicuous little leafy formation (called a stipule) at the junction of the leaf stem with the branchlet; this is always present. The leaf is green on either side, scarcely paler but downy beneath, and finely toothed. The heart-leaved willow grows from 8 to 20 feet high, and is very common in low and wet places.

Long-leaved Willow.
Salix longifolia.
Salix fluviatilis.

The long-leaved willow is easily recognized by its extremely narrow, long leaf, which tapers at each end and is rather coarsely toothed. It is often a shrub, but occasionally, when favored by circumstances, it attains a height of 20 feet.

Long-leaved Willow.

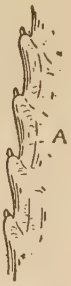
This species is common westward, but rare along the Atlantic coast from Maine to the Potomac River, Virginia.

Crack Willow.
Salix fragilis.

One of our largest willows—the crack willow—came to us from Europe, and was planted at an early date in the vicinity of Boston, in some of the older cities and towns of New Hampshire, and elsewhere in the North. It has since become extensively naturalized. Its twigs are largely used in

Crack Willow.

the manufacture of baskets.* This willow grows 50 to 75 feet, and under favorable conditions 90 feet high. I know of a very old and handsome specimen in central New Hampshire, with a spread of over fifty feet, and a remarkably picturesque contour; it is planted opposite an old and interesting farmhouse, in combination with which it forms a very beautiful picture. The crack willow is not sufficiently appreciated as an ornamental tree; it has been too often displaced by the weeping willow, whose conventional and sober aspect is a poor substitute for the cheerfulness and vivacity of the other tree with its scintillant foliage.† The crack willow may be identified by its shining leaf, which has two tiny excrescences at the base just at the junction with the leaf stem, and rather thick, fine teeth; these, when magnified, look like my sketch at A. The under side of the leaf is whitish and smooth. The twigs are yellow-green, polished, and very brittle at the base; hence the name of the tree.

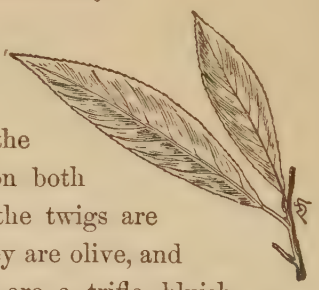


Magnified teeth of Crack Willow.

* It was imported in the especial interest of basket manufacture before the Revolutionary War.

† The sparkling color of the crack willow's foliage is caused by the swaying of the firm leaves in the wind. The weeping willow never shows this effect, but its drooping leaves have a listless motion.

White Willow. *Salix alba.* The white willow, also imported from Europe, is similar in many respects to the foregoing species; in fact, it has become so much mixed with it that a recognition of either species by means of the leaves is far from easy.



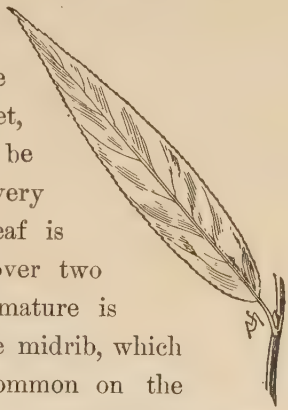
White Willow.

There are also several *varieties* of the white willow. In its typical form the twigs are olive, and the leaves are somewhat silky on both sides. In var. *vitellina* the twigs are yellow; in var. *cærulea* they are olive, and the leaves, smooth above, are a trifle bluish green. In var. *argentea* the foliage is very whitish—silvery gray; but in each instance the leaves in outline taper both ways, and have sharp, thick teeth. The wood of the white willow is used in the manufacture of charcoal for gunpowder. The tree is very common throughout the country.

Weeping Willow. *Salix Babylonica.* It is scarcely necessary to say that the weeping willow is also a species introduced from Europe; but it is extensively cultivated here, and is usually planted beside the water. Gray says in many places it has spread along river banks and lake shores through the drifting of detached branches. The large, graceful tree with its long pendulous branchlets is too familiar an object to

need description. There is a variety called *annularis* (hoop willow), with leaves almost curved into rings.

Black Willow. *Salix nigra.* The black willow has rather rough, blackish bark, and a woolly-stemmed, variable leaf which is most often attenuated lance-shaped.* There is, besides, a little stipule (leafy terminal) at the junction of the leaf stem with the branchlet, though this may not always be present. The branches are very brittle at the base. The leaf is commonly small, not much over two inches in length, and when mature is smooth, except beneath, on the midrib, which is woolly. This willow is common on the banks of streams and lakes. In *salix nigra* var. *falcata* the leaves are extremely long, narrow, and frequently scythe-shaped; they are furnished with stipules (leafy terminals to the leaf stem) which do *not* fall off when the leaves are young; the edges are very finely and sharply toothed. The black willow grows from 15 to 35 feet high.



Black Willow.

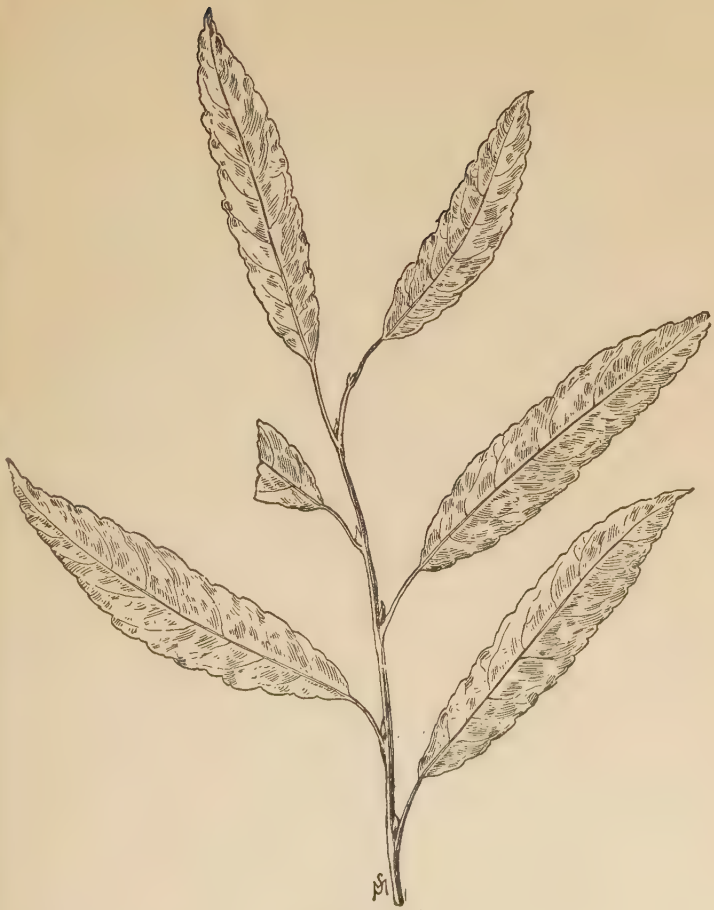
* I mean, for instance, wider *nearest* the base of the leaf, then gradually narrowing to the tip; but one must not rely too much on this form. The leaves are very variable.

Western Black Willow.

Western Black Willow. *Salix amygdaloides.* The Western black willow is found from central New York westward to Missouri. The leaves are rather oval-lance-shaped, pale or often hairy beneath, and have long, slender stems; the little stipules (encircling the stems like leaflets) fall off when the leaves are yet young. This tree grows from 15 to 40 feet high, and is common on the banks of streams from Ohio to Missouri.

Shining Willow. *Salix lucida.* The shining willow may be recognized at once by its bright leaf, which is shiny on both sides, deep green above and lighter below; the shape is elliptical, with an extremely elongated, sharp point. The branchlets are also shiny and olive-green. The shining willow is rather a shrub than a tree, and grows only 15 feet high at most. It is extremely beautiful in bright sunshine by reason of its glossy leaf, and it commonly grows on the banks of streams from Maine to Pennsylvania, westward and northward. It is sometimes called American bay willow.

Shining Willow.



Long-beaked Willow.

Long-beaked Willow.
Salix rostrata.
Salix Bebbiana.

The long-beaked willow is a very common species, which rarely

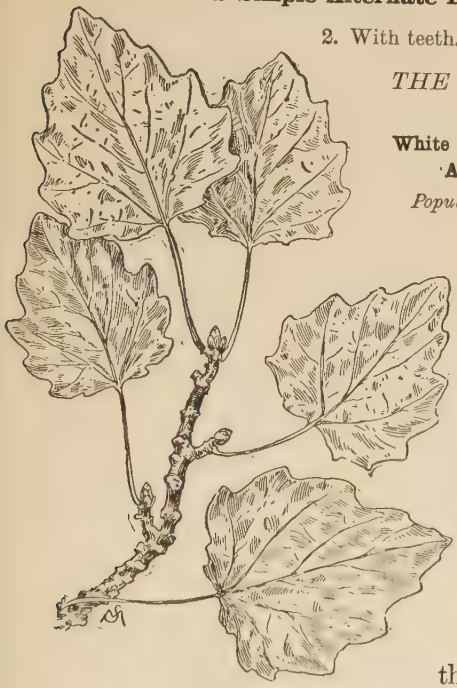
grows to the dignity of a tree; it is seldom over 15 feet high. The leaf is so pronounced in character that I think few of us can fail to recognize it at a glance; it is thin, leathery, large, deep olive-green above, and whitish, blue-green below; when young it is velvety on the under side, but this velvet texture is nearly lost as the leaf becomes older; on the upper side there is also an inclination toward downiness. My drawing shows the edge of the leaf scalloped rather than toothed, and the surface somewhat broken in lights and shadows. This willow is common on roadsides and in moist or dry grounds from Maine to Pennsylvania, westward and northward. It may be found beside the streams which wind through the valleys, and at an elevation of over two thousand feet among the mountains of New Hampshire.

CHAPTER IX.

I. Simple Alternate Leaves.

2. With teeth. A. Edge not divided.

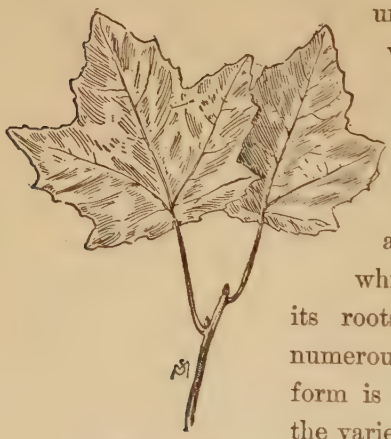
THE POPLARS.



P. Alba.

White Poplar.
Abele Tree.
Populus alba.

ALTHOUGH the white poplar, or, as it is frequently called, abele tree, is not American, it has become so familiar through wide cultivation in this country that I must give it especial notice. It may be identified easily by the extremely white, cottony look of the



P. Alba, var. Nivea.

under side of its leaf, which is variously shaped according to the varieties which I have drawn. The branches of this tree are also downy and white when young, and its roots are apt to produce numerous suckers. Its typical form is less grown here than the varieties.

The variety of the white poplar which, according to Prof. Bailey, is commonest in this country, is called *P. alba*, var. *nivea*.* Its leaves have three or five maplelike divisions, and they are very cottony beneath. Another variety introduced into Europe in 1875, from Turkistan, is called *P. alba*, var. *Bolleana*. This tree has a compact-growing habit, something like the

P. Alba, var. Bolleana.

* *Vide* The Cultivated Poplars, Bulletin 68, L. H. Bailey.

Lombardy poplar; its leaves are rather more deeply divided than those of the var. *nivea*. The white poplars are rapid growers, and frequently attain a height of from 50 to 80 feet.

American Aspen.

American Aspen. Poplar.
Populus tremuloides.

The American aspen is not commonly known by this name; it is most frequently called by the country people "popple," a corruption of poplar. It

seems to me that a more significant and proper name would be trembling aspen, for its leaves flutter with the slightest zephyr. The tree may be easily identified by the trembling of its leaves and the whitish-green color of its trunk. It is never very large, and although in northern Kentucky it may attain a height of 45 feet, in other parts of the country it does not often exceed 25 feet. The flat, white-veined, heart-shaped leaf, of a leathery texture and dull, pale-green color, spreads out on a plane at right angles with a singularly flattened long stem, so limber that it allows the leaf to wiggle with the slightest stir of air. If a small spray or branch of the tree is held in the hand before the mouth and one blows gently on the leaves, it will be seen at once *how* and *why* they tremble in every passing breeze; the swaying motion is exactly like that of a bit of writing paper allowed to fall through the air. The Lombardy poplar leaf also has a long, flat stem, and it sways in the same way.

The aspen is sometimes mistaken for the gray or white birch, because both trees have a whitish trunk, spare horizontal lower and oblique upper limbs, and both are similar in figure; but the leaves of these two trees are entirely different: the birch has an exceedingly brilliant light-green foliage, which reflects the sunlight and quite often dazzles the eye, while the

aspen has a whitish foliage without a suspicion of shininess. Along the banks of the Pemigewasset River, and in the adjacent woodlands, this tree, with its ever-trembling leaves, is a very familiar object. Its smooth, greenish trunk is cut by the lumbermen into short, round logs, which are sent to neighboring mills and ground by powerful machinery, with the aid of water, into a soft pulp; this is pressed into paste-boardlike layers, in which preparatory condition it is sent to various factories for the manufacture not only of paper but of an infinite variety of useful objects, such as pails, stove-mats, wash-tubs, boxes, trays, etc.

Large-toothed Aspen.

Populus grandidentata.

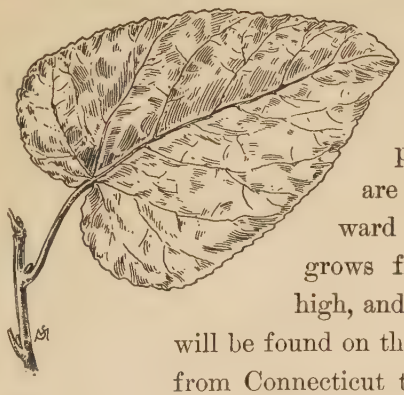
The large-toothed aspen has a larger and coarser leaf than that of the variety just described, and its outline is roundish and irregularly wavy. There are, perhaps, only seventeen coarse teeth to each leaf, and these are very dull-pointed. The leaf stems are also flat and long; in fact, the large-toothed aspen has leaves of nearly the same character as those of its more beautiful relative, but lacking the pretty heart-shape. The leaf is large, however, from three to five inches long, smooth on both sides when old, but covered with down when quite young. The tree is common in the North, but rare southward, except in the Alleghanies. It grows from 40 to 80 feet high,

Large-toothed Aspen.

has greenish-gray, smooth bark, and soft, white wood, which is also ground into pulp and used extensively in the manufacture of paper, etc.

Downy Poplar.
Populus heterophylla.

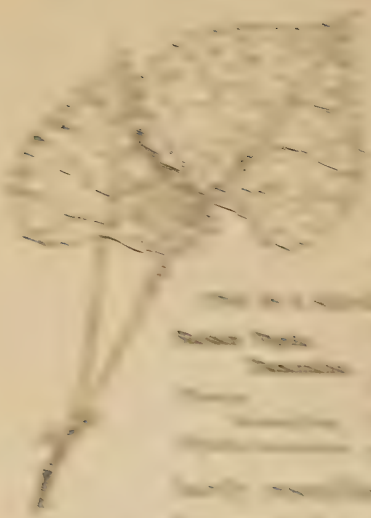
The downy poplar is distinguished by its leaves, which, downy when young and becoming smooth on both sides when older, still retain the *down on the veins beneath.* The leaf is also quite blunt at the end, *never* tapering to a point, and the teeth are obtuse, with an inward curve. The tree grows from 40 to 80 feet high, and is rather rare. It will be found on the borders of swamps from Connecticut to southern Illinois and southward.



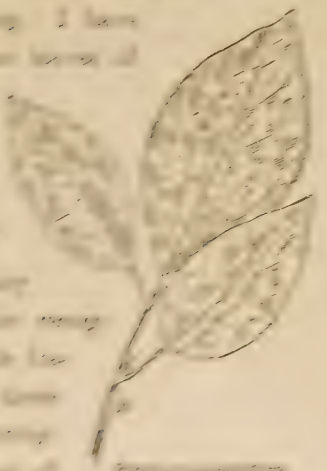
Downy Poplar.

Cottonwood.
Carolina Poplar.
Populus monilifera.
Populus deltoidea.

The cottonwood, or Carolina poplar, is a very large tree of rapid growth, varying from 60 to 150 feet in height. In the Mississippi Valley and immediately west it borders every stream. It can also be found, but not in great plenty, from western New England to Florida. The leaf is similar in character to those of the poplars already described, except that it is quite smooth, glossy, nearly as wide as it is long, and sometimes has incurved, slightly hairy teeth; this last is hardly a very common characteristic, but it is observable in many



figure, and is found in the woods and beside the streams in the Monterey district. The leaf is thick, firm, and leaves count on the ridge, and the large, heavy, pulley leaf buds are covered by spring with a fragrant, resinous covering. I have known for comparison the leaves of the three varieties which grow most luxuriantly and abundantly [illegible] Many [illegible] not [illegible]



Base of blade.

Petiole or stem.

Point of blade.

Blade.

Base of blade.

Petiole or stem.

Point of blade.

Blade.

as soon as the young leaves burst their buds, these are especially curious in spring time. It is purely a matter of taste if one considers the buds fragrant but in practice one is indifferent. To me the smell is extremely suggestive of the "great outdoors," or rather the mildly resinous, wet pungency, reminding of a summer walk, not [illegible] Speaking of an analysis of the perfume in a leaf bud, I should define it [illegible] and bitter elements in the part of essence of boiled leaves. The use of base of blood I put in my hands but [illegible]

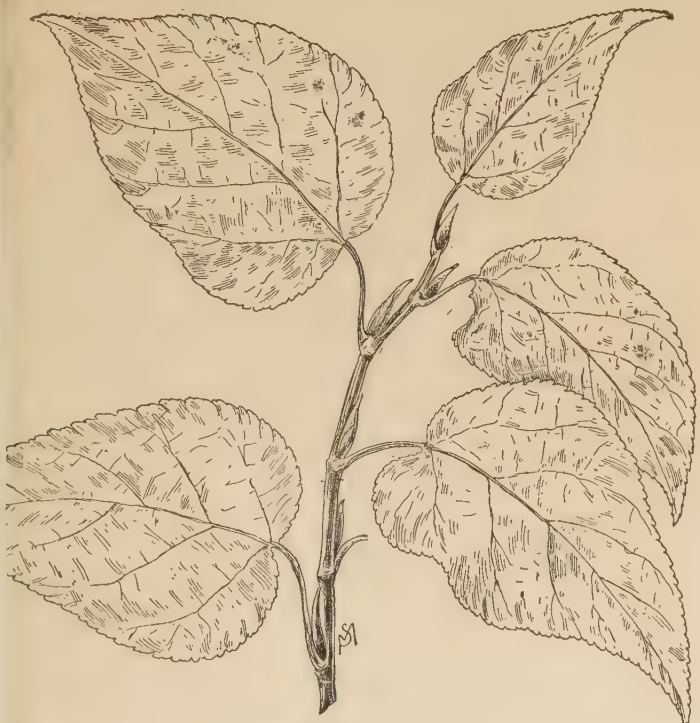
The leaves are large and beautiful, perfectly heart-shaped, green, of a light-olive tone above and whitish (sometimes rusty) beneath; their stems are an inch

P. Balsamifera, var. Intermedia. P. Balsamifera, var. Viminalis. P. Balsamifera, var. latifolia.

and a quarter long, a trifle hairy, and a little bit flattened; sometimes they are touched with red. The bark of the twigs is raw-umber brown in color; that of the trunk is about the same, with darker patches. The tree is exceedingly rare in a wild state, but is very common in cultivation. It was planted on the borders of the lagoon at the World's Fair, where its rich, broad foliage showed in handsome, irregularly rounded masses. The tree in this respect is quite different from the other poplars, which exhibit rather pyramidal figures.

Perhaps the most beautiful of these taller and

slenderer trees is the Lombardy poplar (*Populus nigra*, var. *Italica;* also *Populus dilatata*), which



Balm of Gilead.

ascends like a church spire some 100 feet or more to the sky. It has a pretty, triangularly shaped leaf, with a flattish stem, often red, and a smooth, thin, leathery texture; the teeth are not sharp; the color

Lombardy Poplar.

above is a deep, clear green; that beneath is a little lighter. The trunk of this tree is almost completely covered from the ground upward with suckerlike straight branches; these have a lightish gray-green bark. The Lombardy poplar, one of the most picturesque of objects in a hilly landscape, is unfortunately ill adapted to the severity of our Northern climate. In the Pemigewasset Valley I know of three fine specimens which are gradually losing their tall figures through the bitter cold of the New Hampshire winters; the tops are slowly taking on the appearance of so much perpendicular brushwood bare of every leaf.

CHAPTER X.

I. Simple Alternate Leaves.

2. With teeth. **B.** Edge divided.

THE HAWTHORNS.

The hawthorns, or white thorns, as they are sometimes called, are commonest in the South; but many varieties may be found in the North, where they can always be distinguished from other trees, at all seasons of the year, by their *thorns*.

Washington Thorn.

Washington Thorn. *Cratægus cordata.* The Washington thorn is a tree which grows not over 30 feet in height, greatly esteemed for its beautiful flowers and bright-red berries. The leaf is a deep, lustrous green in summer, and turns late in the fall a rich orange-red. The flowers appear about the last of May; they are white, and

clustered like cherry blossoms, but in miniature. The berries are not much larger than peas; they are bright red, and ripen in September; many of them cling to the boughs throughout the winter, but eventually become brown and sere. The Washington thorn is hardly common, but is found generally scattered through the South from the valley of the Potomac River to northern Georgia and Alabama, and from Tennessee and Kentucky to the valley of the lower Wabash River in Illinois.* It is hardy northward to southern New England, where it flowers later than any of the other thorns. It is a favorite among gardeners for hedges, and it has long since found its way into European gardens. It does not quite equal the English hawthorn (*Cratægus oxyacantha*),† however, for this species has a most charming pink (sometimes white) flower, which has been sung by all the English poets.

English Hawthorn.

There is a narrow-leaved thorn (*Cratægus spathulata*), closely related to the Washington thorn, which

* It has also found its way into Bucks County, Pa.

† There are several large, handsome English hawthorns in the Public Garden, Boston, some of which are *double*-flowered. This species is occasionally found in Bucks County, Pa., running wild.

has a similar fruit, and a singularly long, dark-green leaf, thick, and almost evergreen. This tree or shrub grows sometimes 20 feet high, and is found (it is not very common) from Virginia southward. It flowers in May.

Tall Hawthorn.

Tall Hawthorn. *Cratægus viridis.* The tall hawthorn is a Southern tree, 20 to 35 feet high, whose leaf is most frequently undivided, and rather pointed at each end. Its bright-red fruit is ovoid, and not over a quarter of an inch broad. The branches bear a few large thorns or none at all. This variety is rare in the extreme Southeastern States, but is common west of the Mississippi River, from St. Louis southward to the Colorado River, Texas. It grows beside streams or in low, rich soil.

Parsley-leaved Thorn. *Cratægus apiifolia.* The parsley-leaved thorn has a beautiful, deeply cut leaf, somewhat similar to that of the English hawthorn; the divisions are irregularly toothed and crowded together. The flowers appear in late May; they are white, about half an inch in diameter, and there are many in a cluster. The fruit is rather long ovoid in shape and less than half an inch in

Parsley-leaved Thorn.

length; it is coral-red, and ripens in September. The tree grows from 10 to 20 feet high, and has long spreading branches. It may be found in moist woods or in rich ground from southern Virginia southward to Florida, and westward to Arkansas and Texas.

White or Scarlet-fruited Thorn. *Cratægus coccinea.*

The white thorn, sometimes called scarlet-fruited thorn, is a small tree

White Thorn.

(often a shrub), scarcely over 25 feet high, which may be found in woods or on the borders of fields throughout the North; it is rather rare southward, although

it extends to Florida. The fruit is dull orange-red, and resembles a very diminutive crab apple; it is ripe in September. The flowers grow in clusters similar to those of the English hawthorn, and measure about two thirds of an inch across; they are white, and very often pink-tinged. The leaf is extremely ornamental—conventionally regular in character as well as appearance with its deep-green, smooth, and shiny surface. The branchlets are more or less covered with thorns about an inch long. The white thorn is well worthy of cultivation, as early and late, in flower or fruit, it is both beautiful and decorative.

Scarlet Haw. *Crataegus mollis.* The scarlet haw, which formerly was confused with the preceding variety, is marked with pronounced differences. The fruit is much larger (an inch to an inch and a quarter in diameter); it is sweet and edible, and falls in September. The leaf divisions are less sharply pointed, and the leaf itself is lighter green and much larger. This thorn also flowers early—when the leaves are half grown, in the middle or end of May. The mature leaf measures from three to five inches in length, and is often densely cottony below.

The scarlet haw grows on the margins of swamps and along streams, in rich soil, from Massachusetts Bay to Michigan and Missouri, and from the middle

of Tennessee to Texas. In New England it looks more treelike, and attains a larger size than the other American thorns.*

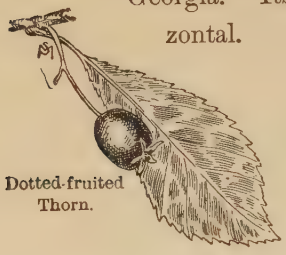
Blackthorn. *Cratægus tomentosa.* The blackthorn has smaller fruit (half an inch long), ovoid in shape and dull-red in color. The leaves have a very doubtfully divided outline—that is, some of them are so slightly incised that they can hardly be called divided. They are light olive-green, and turn dull orange-red in the autumn. The flowers are very ill-scented, and appear two or three weeks later than those of the foregoing variety. This thorn grows from 10 to 20 feet high, and is distributed from eastern New York westward to Michigan and Missouri, and southwestward to Georgia, Tennessee, and eastern Texas. It is not very common.

Blackthorn.

Dotted-fruited Thorn. *Cratægus punctata.* The dotted-fruited thorn has a small leaf (perhaps an inch and three quarters long) which is not divided, but is irregularly toothed; it is pale, dull green. The fruit is an inch in diameter, round, more or less white dotted, and *generally* red, but often deep yellow. This

* *Vide* Silva of North America, C. S. Sargent.

tree grows less than 30 feet high, and is common throughout the North; it extends southward to Georgia. Its branches are always horizontal.



Dotted-fruited Thorn.

Cockspur Thorn. *Cratægus Crus-galli.*

The cockspur thorn is a variety most frequently favored by cultivation; it is very commonly used for hedges. The thorns measure two or three inches in length. The leaves are *not* divided, and are toothed only *above* the middle; they are dark green and shiny above, but pale below; in autumn they turn a dull orange-red. The flowers, which bloom as late as the middle of June, are white, and somewhat fragrant. The fruit is similar to that of the scarlet-fruited thorn, but rather more pear-shaped (very slightly so); it also ripens about the same time, and remains on the tree all winter. The cockspur thorn is found on the margins of swamps, or in rich soil, throughout the North; it extends southward to Florida and westward to Missouri and Texas; it is most abundant and reaches its largest size in Arkansas and Louisiana.

Cockspur Thorn.

Yellow or Summer Haw.
Cratægus flava.

The yellow or summer haw is a Southern variety of the thorn which grows not over 20 feet high, and is esteemed for its fruit, which is edible and pleasant flavored; it is yellow, tinged with red, generally pear-shaped, but frequently round. The leaf is somewhat wedge-shaped, but variable. This thorn extends through the South from Virginia to Missouri.

Yellow or Summer Haw.

Southern Summer Haw.
Cratægus æstivalis.

The Southern summer haw is a Southern thorn which grows not higher than 30

Summer Southern Haw.

Summer Southern Haw, with larger fruit.

feet, and bears fragrant, edible fruit, bright red, somewhat dotted, and about two thirds of an inch in

diameter. This is gathered in quantities where the tree is common, and sold in the markets of the towns in southwestern Louisiana. It is made into preserves and jelly. The leaf is somewhat wedge-shaped, leathery, and toothed above the middle. The summer haw grows from the valley of the Savannah River, South Carolina, to northern Florida; it extends westward to Texas. This tree bears the largest flowers and the best-flavored fruit of all the thorns.

CHAPTER XI.

I. Simple Alternate Leaves.

2. With teeth (some without). B. Edge divided.

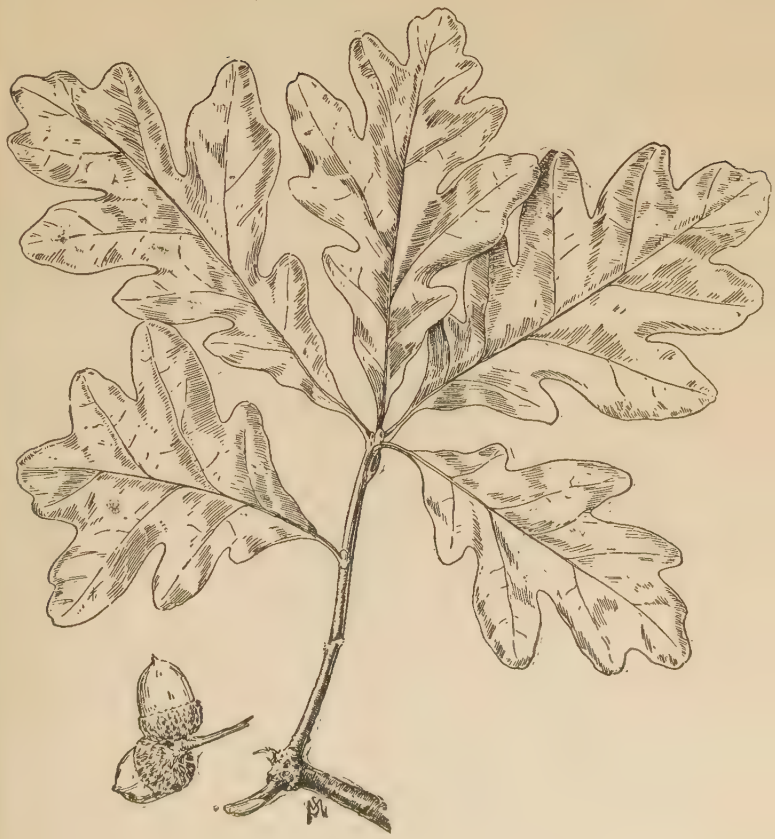
THE OAKS WITH ACORNS WHICH RIPEN IN ONE YEAR.

THERE are so many oaks, and there is such an infinite variety to the shape of their leaves, that it is best for us to learn the exact location * of each species, and carefully note the differences which exist between their acorns, bark, wood, etc. I have therefore placed the oaks in regular botanical order. First come the white oaks, chestnut oaks, and the evergreen-leaved live oak, all of which bear acorns which ripen within the year; next the black and red oaks, whose acorns take two years in which to mature; and finally, the leather-leaved oaks, some of which are almost or quite evergreen in the South; these also take two years in which to ripen their acorns. It

* I am indebted to Prof. C. S. Sargent in many instances for the precise localities of certain species.

will certainly be quite an easy task to identify a tree by its leaf, acorn, and bark, as they are described or drawn here, without the aid of a method of arrangement different from that which will be found in Gray's Field, Forest, and Garden Botany. Of course, the acorn is a "telltale" of the oak; but in case it should not be conveniently present, or we should fail in recognizing it, there are other equally reliable means which I have pointed out of identifying a tree. But we must bear in mind that the certain recognition of a particular species by means of its *leaf* is rendered somewhat difficult at times by *variations*. Little seedlings are especially troublesome in this respect, so one's attention should be turned to the larger trees.

White Oak. *Quercus alba.* The white oak grows from 70 to 100 feet, and in the forest 150 feet high, if it is crowded away from the sunlight; but in the open, where it reaches its fullest development, it sends out great, wide-spreading branches, and attains a very moderate height, with rather a domelike figure. The leaves are round-lobed, narrow at the base, smooth, deep bright green above and pale green below; when very young they are woolly and red; in the fall they turn a rich dark red, and many of them remain on the branches through the winter. The *rough*-cupped (not scaly-cupped) acorn is generally borne in pairs,



White Oak.

sometimes on a short but *usually* on a long stem. The brown nut is sweet and edible.

The bark of the trunk is usually gray, tinged with

brown; it is not very rough, and in old trees it is apt to become detached in large, thin scales.

The white oak is equally beautiful in spring, summer, and autumn; it begins and ends with rich red foliage, and in midsummer it is clothed in luxuriant green. Its hard, tough wood is largely exported to Europe, and it is used in the manufacture of carriages, a variety of useful articles, and for the interior finish of buildings. The tree grows from Maine to Minnesota and southward; it reaches its highest development on the west slopes of the Alleghany Mountains, in Tennessee and the Carolinas, and in the bottom lands of the lower Ohio basin. It is rarely found in northern New England, but farther south it is quite plentiful. At Middleton, Mass., there is a fine tree over 80 feet high, and a certain aged specimen in the village of South Seekonk, Mass., is believed to be six hundred years old.

Post Oak.

Post or Iron Oak. *Quercus stellata.* *Quercus minor.*

The post or iron oak grows from 50 to 60 feet and rarely 100 feet high in the for-

WHITE OAK.

Waverly, Middlesex Co., Mass.

ests. The bark of the trunk resembles that of the white oak; it is a trifle darker. The dark-green leaves are roughened above and below with little hairs; their under side is a trifle grayish; in autumn they turn a dull yellow or light brown. The lobes of the leaves are rounded and sprawling, their bases frequently wedge-shaped. The acorn is small, and has a short stem, on which it usually grows in pairs (sometimes in threes); the cup-shaped cup incases at least one third of the nut.

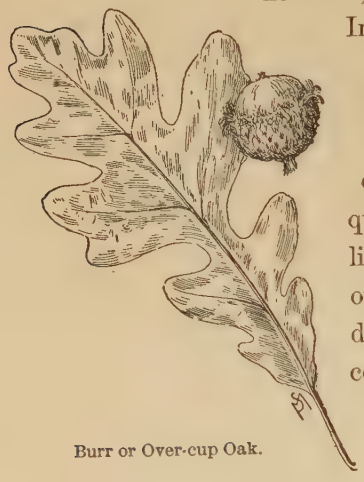
The post oak is found from the eastern extremity of Cape Cod, along the southern coast of Massachusetts, Rhode Island, and Long Island, N. Y., to northern Florida; it is also common in the dry soil of Martha's Vineyard, where its growth is shrublike, with crooked stems. It extends southwestward to Texas, and has its best growth in the dry uplands of the Mississippi basin. Its hard, durable wood is used in making carriages, and other useful articles which require strength of construction. In the distance it is easy to recognize the post oak because of its extremely dark-green foliage.

Burr or Over-cup Oak.

Quercus macrocarpa.

The burr or over-cup oak has an extremely long, deeply lobed (near the middle) leaf, smooth above and pale green and downy below. This is one of the largest of the oaks on the eastern side of the

Mississippi River. It grows under favorable circumstances from 150 to 170 feet high; its average height, however, is not much over 75 feet.

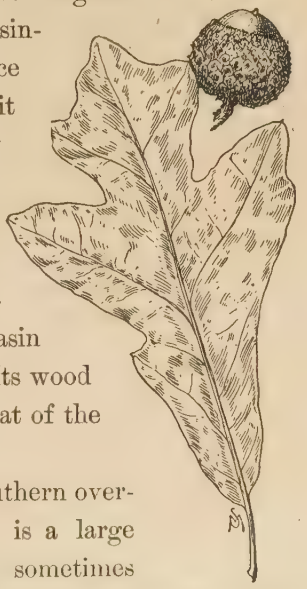


Burr or Over-cup Oak.

In the open it develops a broad, round head and wide-spreading branches. The bark of the trunk is deeply furrowed, and frequently broken into plate-like, light-brown scales; that of the young branches is dark brown, marked with corky ridges or wings. The new leaves are a tender yellow green, and the thicker mature ones deep green and shiny; beneath, the color is lighter; in autumn they turn dull yellow or yellow brown. A mature leaf will measure from six to twelve inches in length. The acorn of this oak is distinguished by the heavy fringing around the nut at the edge of the cup; the cup itself is extremely rough. The acorns usually grow solitary, and vary in size and shape.

The burr oak is found in the Penobscot River Valley, Me., along the shore of Lake Champlain, Vt., and in the valley of the Ware River, Mass.; it is also

in Bucks and Lancaster Counties, Pa., and extends westward to Montana and Indian Territory. The extensive "oak openings" in the prairies are mostly formed of the burr oak; and Dr. P. R. Hoy, of the Philadelphia Academy of Natural Sciences, speaks of it as a Western oak, which can not be excelled in graceful beauty when it is not crowded in growth, but left free to follow the law of its development. The changing colors of the long leaf as it is agitated by the wind give the tree a singularly beautiful appearance in summer; in winter it may readily be identified by its curiously winged branchlets. The tree is most abundant and reaches its finest development in the Mississippi basin and Indiana and Illinois. Its wood is superior in strength to that of the other oaks.



Southern Over-cup Oak.

Southern Over-cup Oak. *Quercus lyrata.* The Southern over-cup oak is a large tree growing 70 to 80 and sometimes 100 feet high, which inhabits the river swamps of North Carolina and southern Indiana, and extends along the coast from south-

ern Maryland to western Florida, through the Gulf States to Texas, and westward to Missouri and Arkansas. According to Prof. Sargent, it is rare in all the States, but reaches its commonest and largest growth in the Red River Valley, La., and the adjacent country of Arkansas and Texas. The leaves are of a reddish-copper color when young, and deep green when mature, with a silvery downiness beneath; they are crowded at the ends of the branchlets; few of them are over seven inches in length; they turn dull orange-red in the fall. The leaf lobes are somewhat acute. The acorn has a roundish cup with very rough scales, which nearly covers the globular nut. The four species just described complete the list of common white oaks.

Swamp White Oak.
Quercus bicolor.
Quercus platanoides.

The swamp white oak belongs to the group of chestnut oaks,* the other three members of which immediately follow. Its leaf has a wavy edge which is *not* deeply cut; it is shiny green above, and silvery-white, downy below. In autumn it finally turns a yellow brownish-buff color. The acorn usually grows on a long stem (frequently in pairs), and has a rough, rounded cup, with a bristling if not a fringed edge. The nut is sweet and edible.

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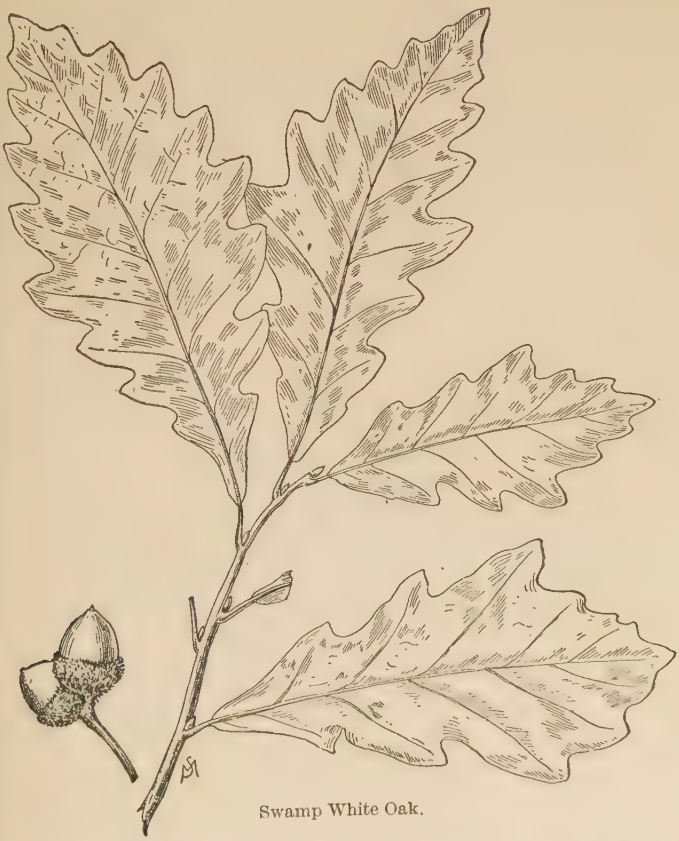
* The leaves closely resemble those of the chestnut.

This oak is commonly found on the borders of streams and swamps; it rarely attains a height of over



Swamp White Oak.

70 feet. In western New York and northern Ohio it reaches its finest development. It is distributed over

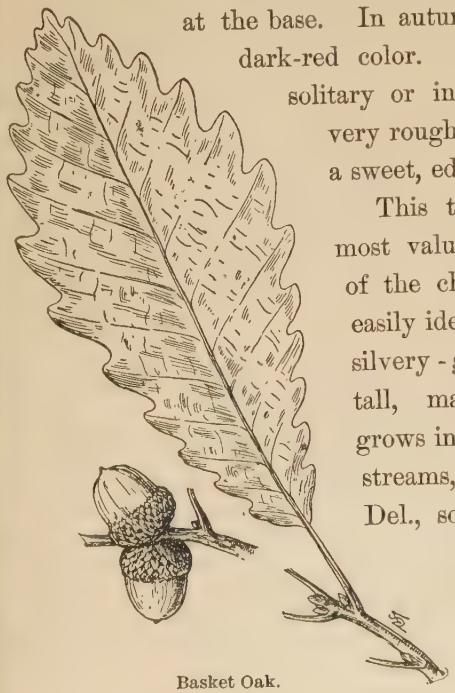
the country from southern Maine to Iowa and Missouri, and along the Alleghany Mountains to Georgia. The young, flaky bark, and small, crooked branchlets which are apt to hang from the heavy limbs of the swamp white oak, make the identification of the tree easy at all seasons.

There is a small but symmetrical swamp white oak near one of the little ponds in the Arnold Arboretum, which is somewhat isolated and picturesquely defined in the landscape over against the north. One of the largest specimens of which a record has been preserved grew on the Wadsworth estate, one mile from the village of Geneseo, in the western part of New York. The "Wadsworth oak," as this tree was called, met with destruction several years ago by the washing away of the bank of the Genesee River. In 1851 the short trunk had an average circumference of twenty-seven feet.* There is also a very beautiful tree, 65 feet high, on the edge of the water south of a kame, in Waverly, Mass.

Basket or Cow Oak. *Quercus Michauxii.* The basket or cow oak, another of the chestnut oaks, gets its name from the fact that its wood, which is easily split into thin strips, is largely used for making baskets. It is a tree which not infrequently attains a height of 100 feet.

* Some Large Trees in Western New York, Buckley, American Journal of Science, vol. xiii, p. 397.

The leaf is similar in shape and character to that of the foregoing species, but it is extremely woolly beneath. It is also blunt (*not* wedge-shaped) at the base. In autumn it turns a rich dark-red color. The acorn grows solitary or in pairs, and has a very rough, shallow cup, and a sweet, edible nut.



Basket Oak.

This tree is one of the most valuable and beautiful of the chestnut oaks. It is easily identified by its flaky, silvery-gray bark, and its tall, massive trunk. It grows in swamps and beside streams, from Wilmington, Del., southward to northern Florida, and extends from Indiana and Missouri southward to Texas and the Gulf.

Chestnut Oak. *Quercus Prinus.* The chestnut oak grows from 60 to 70 and occasionally 100 feet high, and has leaves which somewhat resemble those of the chestnut tree. They are orange-green when young, and decidedly yellow-green when mature. In the

autumn they turn a lovely warm buff-yellow, with occasional touches of pale scarlet. They are minutely downy beneath, but very smooth above.

Chestnut Oak.

The chestnut oak is generally found on hillsides and on high banks of streams. It is very common along the lower banks of the Hudson River and in the vicinity of New York city. It extends generally from the southern coast of Maine to Delaware and

the District of Columbia, and follows the Alleghany Mountains as far south as Alabama. It attains its finest development in the mountains of North Carolina and Tennessee. In the North it may also be found on the west shore of Lake Champlain, in the valley of the Genesee River, N. Y., and on the shores of Lake Erie; from here it extends southward to Tennessee.

I do not find the chestnut oak at all common in New Hampshire. In the valley of the Pemigewasset River it is entirely absent; but in the village of Bedford, in the southern part of the State, there is a large specimen near the house of Mr. S. Manning which is remarkably beautiful.

A large and famous tree is now standing at Presqu'ile, near Fishkill-on-the-Hudson, under which, it is said, Washington in 1783 used to mount his horse when he went from his headquarters on the west bank of the river to the army encampment at Fishkill. The diameter of its trunk is fully seven feet, and a hundred years ago it was famous for its age.*

The bark of the chestnut oak is particularly rich in tannin, and is much used in the tanning of leather. The tree is one of the most beautiful of all the oaks. Its rich, warm, green foliage marks the landscape

* Garden and Forest, vol. i, p. 511.

with agreeable luminous color, especially in the middle distance.

Yellow Chestnut Oak.
Quercus Muhlenbergii.
Quercus acuminata.

The yellow chestnut oak has a peculiarly narrow leaf scarcely two inches in width, which more nearly resembles the chestnut leaf than that of any other chestnut oak. The tree grows from 80 to 100, and sometimes 160 feet high, but it rarely exceeds an altitude of 50 feet when growing in the open. The bark of the trunk is dull, silvery gray, with a more or less scaly surface. The leaves, which are a beautiful yellow green above and silvery gray below, are crowded at the ends of the branches, and hang so that the under surfaces show with every passing breeze. This imparts a novel and delightful flickering color to the tree which reminds one of the trembling aspen; but the oak's shift of light is slower, and its coloring is far richer. In autumn the leaves turn an orange-bronze hue.

Yellow Chestnut Oak.

The yellow chestnut oak grows on rich lands over the same extent of country (but in lower regions) as the chestnut oak. It extends no farther northeast than Massachusetts, but in the West it is found as far as Nebraska and eastern Kansas. It also extends through the South to Texas. It attains its fullest proportions in the valley of the lower Wabash River and its vicinity.

The acorn has a rounded, thin cup with close scales, which most frequently covers one third of the nut.

These four species conclude the list of chestnut oaks.

Live Oak.

Quercus virens.
Quercus Virginiana.

The live oak has an essentially different leaf from those which I have already described. It is evergreen, thick and leathery, has no lobes or divisions, and is rarely, if ever, toothed. It measures from two to five inches in length, and is smooth, dark green above, but hoary beneath. The acorns are rich dark brown in color, and have a rather pointed nut with a sweet kernel. The leaves remain green well on into the winter, and then turn yellowish brown, falling only when

Live Oak.

the new leaves appear in the spring. The wood has a yellowish color and is extremely heavy, a cubic foot weighing a trifle over fifty-nine pounds. It has a beautiful grain and is susceptible of a fine polish, but it is extremely hard to work, and takes the edge off every tool. Years ago it was highly esteemed for shipbuilding, and in 1799 the Government spent two hundred thousand dollars in the purchase of Southern lands on which live-oak timber was growing suitable for the navy. The use of iron in modern shipbuilding, however, having greatly diminished the need of oak timber, the Government, by the consummation of an act finally approved by Congress in February, 1895, opened for entry and occupation by the public large tracts of wooded land which it had held for many years in the interest of the navy.*

Live oak grows from Virginia southward near the coast to Florida, where it abounds. It extends along the Gulf States to Texas, where it reaches its limit in the valley of the Red River and the extreme western borders of the State. It varies in size from a mere shrub to a tree 40 or 50 feet high.

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* *Vide* Silva of North America, C. S. Sargent.

CHAPTER XII.

I. Simple Alternate Leaves.

2. With teeth (some without). B. Edge divided (some undivided).

THE OAKS WITH ACORNS WHICH RIPEN IN TWO YEARS.

Red Oak. *Quercus rubra.*

The red oak grows from 70 to 80 feet high, and is the most northern species of the country. I find it very common in the White Mountain region of New Hampshire. A handsome though not large specimen growing on the slope of Sunset Hill, Campton, measures 45 feet in height, and has a trunk with a circumference of over nine feet. The red oak extends from Maine to Tennessee, and follows the Alleghany Mountains to northern Georgia; westward it extends to Minnesota and central Kansas. In the summer its bristle-tipped leaf is bright green, and in the autumn it turns a rich, deep red or a dull orange. The acorn requires two years in which to mature; its cup is saucer-shaped, and the nut is large. The tree attains its greatest size in the

States north of the Ohio River, but at its southern limit it is very small.

The red oak, near the northern borders of the

Red Oak.

United States, often bears leaves with fewer divisions, and smaller acorns; but such forms are so intermixed and inconstant that they can not be considered varie-

ties.* My larger drawing was taken from a young tree in Campton, N. H., and that of the single leaf was taken from a tree in New Jersey.

The bark of the trunk is dark gray-brown, with a surface of scaly plates. The tree grows rapidly and is peculiarly adapted for the ornamentation of parks and roadsides in the most northern States, although it is by no means as beautiful as the following species.

Red Oak.

Scarlet Oak. *Quercus coccinea.* The scarlet oak deserves its name, as the leaves turn a most brilliant red, *all but* scarlet.† This statement may seem a trifle anoma-

* *Vide* Silva of North America, C. S. Sargent.

† Scarlet is a red thoroughly saturated with yellow; vermilion is typical of such a color, and it is commonly seen in the Madame Crozy canna.

lous, but the name is not inapplicable, for "scarlet" is a word commonly accepted as synonymous with bright red, and the foliage of this species turns a more

Scarlet Oak.

brilliant color than that of any of the other oaks. The leaf is bright red when it is born, lustrous green when it reaches maturity, and burning red when it dies. It

is also, as Ruskin would say, "deeply rent," for the lobes are cut *very* deeply, and impart a very ragged appearance to the foliage.

The acorn has a thick, top-shaped cup, which covers the third of the nut. The kernel is bitter and whitish. The bark of the trunk is thick, brownish, and roughly seamed. The tree grows from 70 to 80 feet high, and is one of our most charmingly ornamental sylvan characters, particularly suited to the landscape garden because of its beautiful autumn coloring, and its vivacious leafage which fairly sparkles in the sunlight.

The scarlet oak grows beside the Androscoggin River in Maine, and extends thinly through southern New Hampshire to Vermont and central New York. It also extends from Massachusetts Bay to the District of Columbia and along the Alleghany Mountains to North Carolina; westward it is found from Michigan and Illinois to Nebraska and Minnesota.

Black Oak.
Quercus coccinea, var. *tinctoria.*
Quercus velutina.

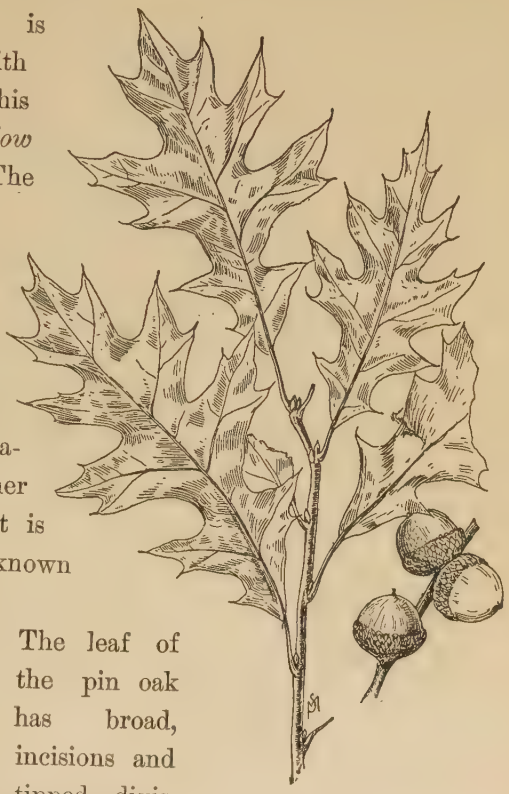
The leaves of the black oak are not so deeply incised as those of the scarlet oak, and its trunk is much darker in color; in fact, its branches often appear blackish. The tree grows 70 to 80 and rarely 150 feet high. It has a wide range, which extends from New York to the Gulf States. Its limit eastward is in southern New

England, and westward in Kansas and Texas. The finest growth is in the valley of the lower Ohio River.

Black Oak.

The leaf is somewhat thin, dark green when mature, with a yellower under surface, and in autumn it turns a dull, rich, leather-red color. It falls during the winter. The acorn is small, and has a deep cup with rather a jagged rim and rough surface. I have no-

ticed that many of the smooth nuts are striped, but a much more reliable characteristic is connected with the kernel; this is very *yellow* and bitter. The inner bark of this oak is orange in color and saturated with tannin, which makes it valuable to the tanner and dyer. It is commercially known as quercitron.



Pin Oak.

Pin or Swamp Spanish Oak. *Quercus palustris.* The leaf of the pin oak has broad, rounded, deep incisions and sharp, bristle-tipped divisions; it is bright green above and a trifle paler below in summer, and in autumn it changes to a rich bronze red. The acorn has a saucer-shaped cup with thin scales, and a round-

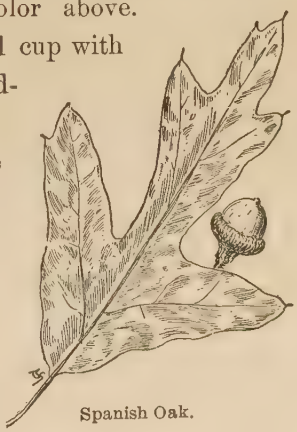
ish nut barely half an inch in length. This oak is common on the borders of swamps and in low lands from Connecticut westward to Missouri, and southward to the Potomac River, Virginia; it also extends from central Kentucky to the eastern parts of Indian Territory. It is rare and small in New England, and reaches its finest development in the valley of the lower Ohio River. It grows 70 or 80 and in thick forests occasionally 120 feet high. The bark is light gray-brown, smoothish, and has small scales. The wood is reddish and coarse-grained. The pin oak gets its name from the pinlike appearance of the tiny branchlets which are set in the limbs and trunk. I know of no beautiful specimens of this tree in New England, excepting two comparatively youthful ones in the Arnold Arboretum, near the residence of Mr. Jackson Dawson; but in Flushing, L. I., in Fairmount Park, Philadelphia,* and in Prospect Park, Brooklyn,† there are quite a number of handsome and symmetrical large trees, which can not fail to attract attention.

* In this park there is an avenue of beautiful pin oaks which, although they were planted as late as 1881, have already attained symmetrical proportions and an average height of 30 feet. The trunks are about a foot in diameter now, but when the trees were planted they measured about an inch and a half.

† Prospect Park is particularly fortunate in the possession of many splendid large trees. In this respect it excels Central Park, New York.

Spanish Oak.
Quercus falcata.
Quercus digitata.

The Spanish oak is distinguished by its broad-ended, three- to five-divisioned leaf, which is always downy underneath and of a somewhat dull-green color above. The acorn has a saucer-shaped cup with a top-shaped base, and a roundish nut with a bitter kernel; it is nearly stemless. The tree grows from 40 to 70 feet high, and is found in dry or sandy soil from Long Island through New Jersey to Florida;* westward it extends from southern Indiana and Illinois to Missouri and Texas. The bark is blackish brown and is deeply furrowed. It contains a large amount of tannin, and is therefore valued by the tanner.



Spanish Oak.

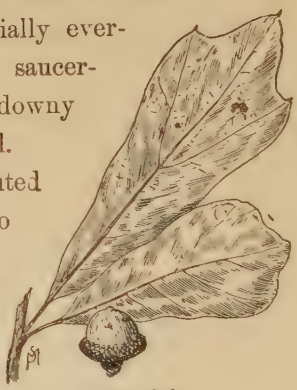
The Spanish oak and the four species preceding it complete the list of black and red oaks which are common. Their acorns require two years in which to ripen.

Water Oak.
Quercus aquatica.
Quercus nigra.

The water oak, as its name implies, is found in wet situations. It grows from 30 to 40 and occasionally 80

* It is also reported from Bucks County, Pa.

feet high. In summer the leaf is a glossy, rich bottle-green, and in autumn it changes to a duller green, and remains that color well on into the winter. It is, in fact, partially evergreen. The acorn has a saucer-shaped cup, and a globular, downy nut with a very bitter kernel.



Water Oak.

The water oak is distributed from southern Delaware to Tampa Bay, Florida, and thence through the Gulf States to Texas. It also extends from the centers of Kentucky and Tennessee to Missouri and Arkansas. The bark is comparatively smooth, and light brown, with close scales.

The leaves are variable, but I have drawn the commonest types.

Black Jack or Barren Oak.
Quercus nigra.
Quercus Marilandica.

The black Jack or barren oak has a singularly wedge-shaped, broad-ended leaf, thick, dark shining green above, and

Black Jack Oak.

yellowish and rusty colored below. In autumn it turns brown or brown-yellow. The acorn has a coarse-scaled, top-shaped cup which half covers the nut. It is nearly but not quite stemless.

The black Jack oak is common in sandy barrens, and extends from Long Island southward to Tampa Bay, Florida, and westward to southeastern Nebraska and Texas, including portions of the intermediate country. It is a small tree, 20 to 30 or rarely 50 feet high.

Laurel or Shingle Oak. *Quercus imbricaria.* The laurel or shingle oak grows from 30 to 60, and in low, rich grounds occasionally 100 feet high. Its leaf is similar to that of the laurel; thick, stiff, dark green, smooth, and lustrous above, and pale green and downy below. In autumn it turns a rich, leather-red color. The acorn has a globular nut and a thin cup with close-pressed scales. The kernel is bitter. The bark is light brown, and has close, ruddy scales. The wood from an early date has been used in the making of shingles—hence the name "shingle oak." This species is commonly found in rich woodlands from Lehigh County, Pa.,

Laurel Oak.

to Wisconsin, Missouri, and northeastern Kansas. It extends southward along the Alleghany Mountains to Georgia and Alabama, and also from Tennessee to northern Arkansas. Its largest growth is in the valley of the lower Ohio River.

Willow Oak.

Willow Oak. *Quercus Phellos.* The willow oak (60 to 80 feet high), so named because its leaves resemble those of the willow, is a beautiful tree which frequently shades the streets of Southern towns. The leaf is a brilliant light green above, and dull, pale green below. The tiny acorn has a saucer-shaped cup and a small globular nut. The kernel is orange-yellow and bitter. The stem is exceedingly short.

This oak is found on the borders of swamps or in sandy, low woods, from Tottenville, Staten Island, N. Y., to northeastern Florida. It is also distributed along the Gulf States to Texas, and extends from southern Kentucky through Tennessee to Arkansas and southeastern Missouri.

The bark is reddish brown, and has close scales; it is comparatively smooth. The willow oak is a beautiful shade tree, whose remarkable foliage lights up

prettily in the sunny South. Its small, leathery leaf remains green long after those of other trees are brown and sere. The tree has also the advantage of being a rapid grower. One of its most distinguished relatives, the English oak (*Quercus Robur*), is hardly more interesting or beautiful. Certainly the contrast between these two trees of the same family could not be greater. There is hardly a point of resemblance between them. The great aged oaks of England * are nursed and guarded with something like reverential awe. Their historical associations are cherished records. But the American willow oak is a tree without a history. Nevertheless, it is certainly a modern sylvan beauty, refreshingly novel, and decidedly unconventional.

The willow oak and the three species which precede it complete the list of common leather-leaved oaks, some of which are nearly or quite evergreen in the South.

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* Some of these English oaks were planted about the time of the Norman conquest, 1066. Cowthrop oak, Cowthrop, Yorkshire, is seventy-eight feet in circuit at the ground, and is at least eighteen hundred years old. The Cowthrop oak is on the estate of Lord Petre; it has a girth of sixty feet, and previous to the destruction of its largest branch by a storm in 1718, it spread over half an acre. There is one in Dorsetshire said to be its equal in age, and one near Fountain Abbey, Ripon, in Yorkshire, is certainly over twelve hundred years old.

CHAPTER XIII.

I. Simple Alternate Leaves.

2. With teeth. B. Edge divided.

BUTTONWOOD AND LIQUIDAMBER.

Buttonwood or Sycamore.

Platanus occidentalis.

The buttonwood, which is also commonly but quite improperly called sycamore, is a tall, ruggedly handsome tree, which sometimes attains a height of 150 feet. Gray calls it our largest tree, and Whittier has made it celebrated in his poem entitled The Sycamores. The Occidental plane trees —Hugh Tallant's sycamores, sung by the poet— were planted by the Irish pioneer in 1738, over a century and a half ago, beside the Merrimac River, where now stands the city of Haverhill, Mass.* Beneath their shade, tradition says, Washington passed in his triumphal journey through the North in 1789,

* Only two or three of these trees now remain standing; they measure about six feet in trunk circumference. Formerly a long row of them adorned what is known as the Saltonstall estate.

the year of his election to the presidency of the new nation; and to this day,

> Still green and tall and stately,
> On the river's winding shores,

surrounded by city sights and sounds, stand the old buttonwood trees.*

Kentucky is the favorite home of the buttonwood, and in its rich soil the tree thrives far better than it does in the less fertile regions of the North. Beside the grave of Daniel Boone, in the cemetery at Frankfort, stand several handsome trees which, although they are not very tall, possess ample and graceful proportions.

I found in the village of Plymouth, N. H., two grand old specimens, which I have sketched; these must be quite one hundred years old. Among the leaves which had fallen from the trees in October last were several handsome russet-colored specimens which measured ten inches in width. The leaves are boldly if not beautifully modeled, and have a fine leathery texture; the few teeth which they possess are so large that the leaf really appears to have an undisturbed, entire edge. I remember, as a child,

* It is said that under these trees, which form a green archway over the river road, Whittier conceived the plan of his poem, Skipper Ireson's Ride.

Buttonwood Leaf.

several large sycamores on Washington Square in New York, the hollow trunk of one of which was the haunt of a gray squirrel, the pet of the policeman in charge of the park and of the children in the neighborhood; but that particular tree has long since disappeared, and within a few feet of the spot where it stood is now the beautiful white marble Washington Arch. The bark of the buttonwood has a peculiar way of peeling off each year in broad, thin, brittle scales; this gives the trunk a remarkable patched effect in light buff and brown-gray color, quite sufficient for the complete identification of the tree. The fruit is a pretty little, round, buttonlike ball, which hangs by its long, wiry stem swinging in the wind through the greater part of the winter.

The buttonwood attains its greatest proportions in the valleys of the Ohio and Mississippi Rivers, where it is commonly seen over 80 feet high. Its wood is brownish, coarse-grained, and apt to crack; it also decays rapidly if exposed to the weather; nevertheless, the grain of the wood is exceedingly beautiful, and shows itself to great advantage in the interior trimmings of a house. It is also used in the manufacture of cigar boxes.

The Oriental plane tree (*Platanus orientalis*), sometimes planted in our parks, is very similar to

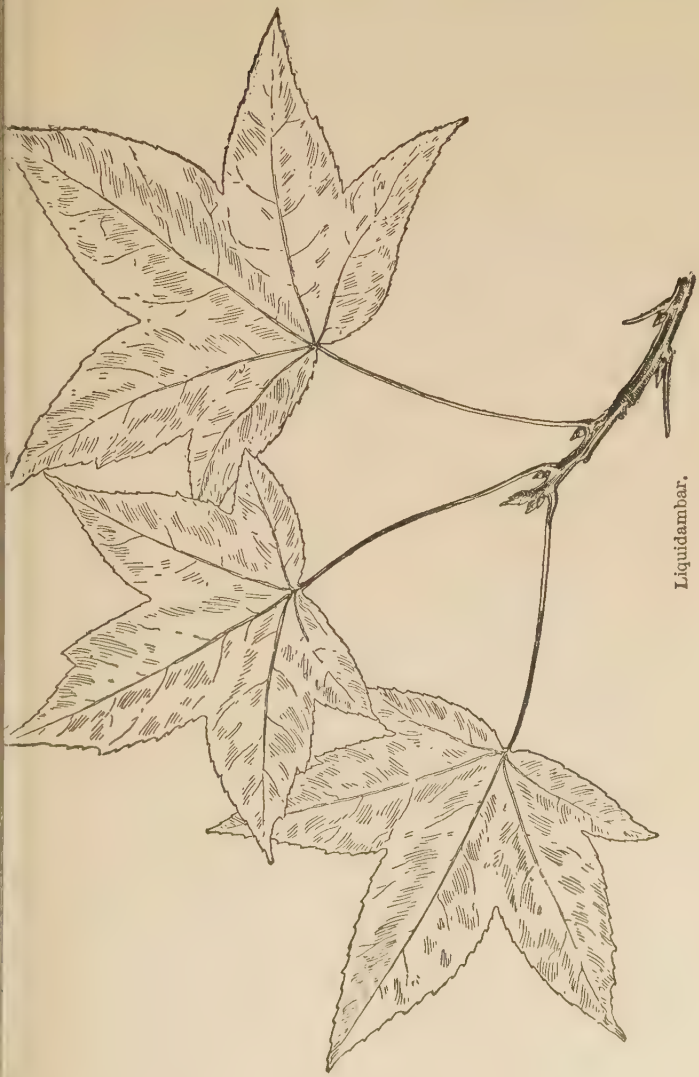
the American variety, but its leaf is not as large and is more deeply cut; its shape is very nearly like that of the sugar maple. This tree is not as hardy as the native variety.

Liquidambar, Sweet Gum, or Bilsted.

Liquidambar styraciflua.

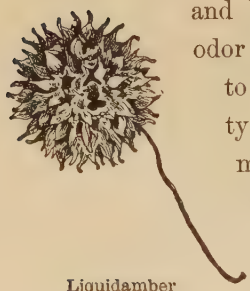
The liquidambar, sometimes called sweet gum, is one of the most magnificent of our American trees. In the South it not infrequently reaches a height of 100 or even 140 feet. Its name is derived from *liquidus* (fluid) and the Arabic *ambar* (amber), in description of the yellow juice which exudes from the tree; this has a fragrant, balsamic odor, which evidently accounts for the name sweet gum. The gum is used for medicinal purposes.

The leaf of this tree is very regular and beautiful in shape as well as coloring; in the fall of the year it assumes a golden-yellow tint, clouded over irregularly with a rich red; in summer its green is deep, smooth, and shining; it does not vary much from these hues. I might liken its shape to that of a star-fish, but with broad points and a one-sided radiation. The teeth are very fine and even, and the divisions vary from three to seven; five is the commonest number. The base of the leaf is, of course, heart-shaped, but sometimes it is flatter in effect than my sketch indicates. There is a little woolly tuft on the back of the leaf just where the ribs meet.



Liquidambar.

The bark is brown-gray, and is seamed vertically; the branches push out at almost right angles below (not so very far from the ground), and if these are examined it will be found that they are covered with strange, corky-looking ridges, reminding one of a fungous growth. In a warm climate the sweet-smelling gum is frequently noticeable on the bark, and by bruising the leaf the same spicy odor may be obtained. One is enabled to recognize the tree without difficulty by means of the leaf and the aromatic sap. But this is not enough; the liquidambar is deserving of our closest attention. From the conventional and decorative seed-ball, filled with a lot of abortive seed (there are few good ones) fine as sawdust, to the wide expanse of the charmingly proportioned tree itself, it is beautiful in every way; as a shade tree it has few rivals, and as an ornament for a park or private grounds it has no equal, unless it be the sugar maple. Both trees frequently assume a perfect egg-shaped outline, but in its leafy details I consider the liquidambar decoratively superior to the maple. The tree reaches its finest growth in the Mississippi Valley; it can rarely be found north of Connecticut, and it is commonest south of Baltimore and St. Louis. Curi-



Liquidamber seed vessel.

ously enough, although the liquidambar bears no resemblance to the witch-hazel (*Hamamelis Virginiana*), it belongs, with only two other members, to the Witch-Hazel family.

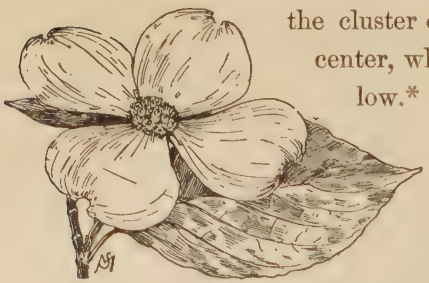
CHAPTER XIV.

II. Simple Opposite Leaves.

1. Without teeth. A. Edge not divided.

FLOWERING DOGWOOD, ETC.

Flowering Dogwood. *Cornus florida.* The flowering dogwood is distinguished by apparent, large, dull-white flowers with four notched petals; but these are really *bracts* (leaflets) set around the cluster of *true* flowers in the center, which are greenish yellow.* The leaves are from three to five inches long, and have indented whitish ribs nearly following the general curve of the edges; they turn a rich red in autumn. The bunches of ovoid, bright-



Flowering Dogwood.

* They bloom in Massachusetts in late May, and in Texas in March.

red berries are ripe in early autumn, when with the changing foliage they produce a very decorative effect on the tree. The flowering dogwood grows from 15 to 40 feet high, and is common in dry woods from southern New England to Florida, Texas, and southern Missouri. There are several beautiful though not large specimens in the Arnold Arboretum, where, with many other foreign species, they combine in making the roadsides gorgeous in October.

Alternate-leaved Dogwood. *Cornus alternifolia.*

The very name of the alternate-leaved dogwood seems to imply that it is out of place here in my leaf classification. But this particular species is an exception to the rule, and ought not to be separated from its relatives, as its general appearance also rather inclines one to think it opposite-leaved—look at my sketch! The leaves really seem opposite, but they are not; one stem grows independently just *below* the other, and not conjointly with it.* For the reverse of this arrangement look at the red maple, which very likely will be found growing beside the dogwood, convenient for comparison. The alternate-leaved dogwood has very beautiful, slender, coral-like

* It occasionally happens, though, that the leaves *do* grow opposite.

red stems bearing pretty, dark, gray-blue berries, which are ripe in early October. The tree is com-

Alternate-leaved Dogwood.

mon beside the roads and on the banks of streams in the mountain regions of New Hampshire; in fact, it is a familiar object in all the Northern States; it also extends southward through the Alleghany Mountains as far as northern Georgia and Alabama. It is oftenest found in shrub form, but frequently it grows to a height of 25 or even 30 feet.

For the sake of comparison with the alternate-leaved variety, I draw a spray of red osier (*Cornus*

Red Osier Dogwood.

stolonifera), which is opposite-leaved. This charming species is frequently a prominent object on the border of a snow-clad meadow in midwinter, when its bright-red twigs may be distinguished a mile away. It is merely a shrub, which grows only 6

feet high. Its foreign relative, the Siberian red-stemmed cornel (*Cornus alba*), is another shrub or tree handsomely colored; this variety is often found in parks and gardens; it has a white berry.

Tartarian Honeysuckle. *Lonicera Tartarica.*

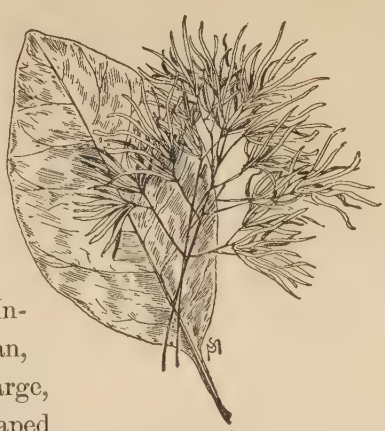
The Tartarian honeysuckle, although it does not belong to our country, has become pretty firmly rooted in our parks and gardens. It often grows to the height of nearly 20 feet, and is occasionally trimmed into a treelike figure. There is just such a well-trained tree in the Public Garden, Boston, which is very beautiful in its spring dress. The leaves are smooth and somewhat heart-shaped. The flowers grow in pairs, and are of a soft, magenta-pink color; they bloom in May in great profusion. This honeysuckle comes from Asia.

Tartarian Honeysuckle.

Fringe Tree. *Chionanthus Virginica.*

The fringe tree has a smooth, thick leaf, three to six inches long, which resembles that of the magnolia. It gets its name from *χιών*, snow, and *ἄνθος*, flower, in allusion to the snow-white flower clusters; these hang in beautiful, loose, drooping tassels, which in early June give the tree a very ornamental appearance. The petals of the flower are narrow, and about an

inch in length. The oval fruit is half an inch long, and purple covered with a bloom. The fringe tree grows from 8 to 30 feet high, and is commonly cultivated; it is found wild along the river banks of New Jersey, south Pennsylvania, and the Southern States.



Fringe Tree.

Catalpa. Indian Bean.

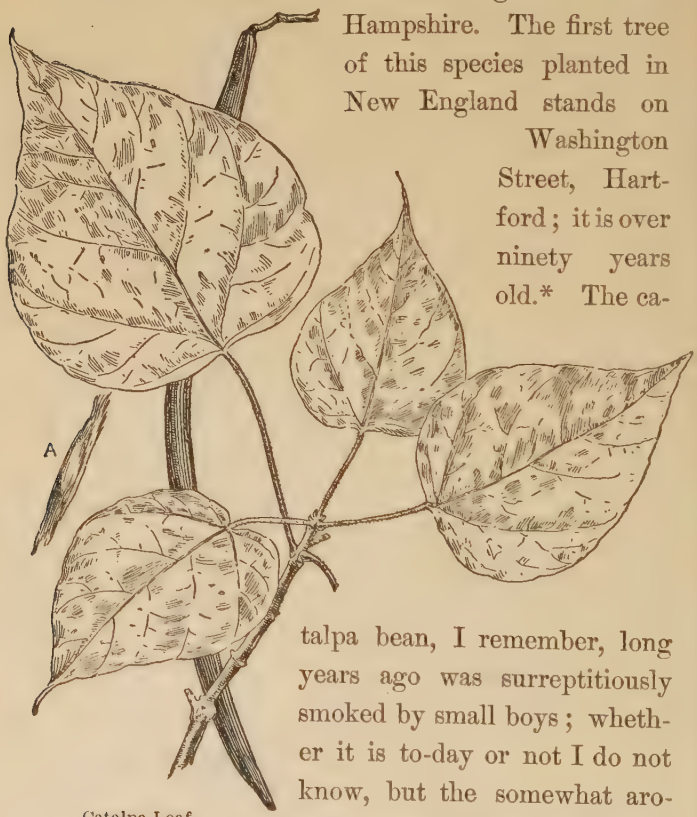
Catalpa bignonoides. Catalpa Catalpa.

The catalpa, or Indian bean, has a large, light-green, heart-shaped leaf, smooth above and downy below, especially on the ribs; the stems are also woolly. The tree grows from 20 to 40 feet high, and has wide-spreading, coarse, stiff branches, with bark of a light buff-gray color. The trunk has dull, silver-gray bark slightly seamed up and down. The delicate, sweet-scented flowers are white, plentifully spotted with yellow and purple; they appear in thick clusters in early summer.*

The catalpa is common from New York city southward, and is cultivated as far north as Albany

* It is said that honey collected from these flowers has poisonous properties.

and Boston; in fact, I know of several flourishing, good-sized specimens beside a hotel in the White Mountain region of New Hampshire. The first tree of this species planted in New England stands on Washington Street, Hartford; it is over ninety years old.* The catalpa bean, I remember, long years ago was surreptitiously smoked by small boys; whether it is to-day or not I do not know, but the somewhat aromatic smell of a smoldering



Catalpa Leaf.

* *Vide* Trees and Tree Planting, by General J. S. Brisbin.

pod haunts one's memory, and it was vividly recalled to mine, bringing with it a long chain of old associations, by a recent visit to an Italian cathedral in which incense had been burned. The pod is ten inches long, of a dull, light-brown color; its seeds are winged and fringed (see the drawing at A). The tree is a rapid grower.

Western Catalpa. *Catalpa speciosa.* The Western catalpa is a much larger species; it frequently attains a height of from 40 to 70 feet. Its leaf is similar to that of the other catalpa, but the two-inch-long nearly white flowers are *pale-spotted*, and the pod is coarse and thick. This tree is found growing wild in rich woodlands in southern Indiana and immediately south and west. Gray says the catalpa is sometimes called Cigar Tree, from the alleged use of the ripe pods as cigars. The wood is grayish-white and susceptible of a high polish, but it is not in common use by cabinetmakers.

CHAPTER XV.

II. Simple Opposite Leaves.

2. With teeth. A. Edge not divided.

BURNING BUSH, ETC.

Burning Bush. Wahoo.

Evonymus atropurpureus.*

The burning bush, sometimes called wahoo and spindle tree, is most frequently found in the form of a tall shrub; but it is very often cultivated and trimmed so as to appear treelike. It sometimes attains an altitude of nearly 25 feet when circumstances are advantageous. The minutely toothed leaves are about the color of those of the holly, but have a waxy finish; they are from two to five inches long; in autumn they turn pale yellow. The flowers, which appear in June, have a four-parted appearance; the rounded petals are deep

Burning Bush
Wahoo.

* Also spelled *Euonymus*: from εὖ, good, and ὄνομα, name, because it has the bad reputation of poisoning cattle.—*Gray.*

purple. The fruit, which ripens in October, is also four-parted, and hangs on long, slender stems; it is half an inch broad, light magenta-purple in color, and imparts to the tree a very ornamental appearance in autumn. The burning bush grows wild from western New York to Wisconsin, Nebraska, Indian Territory, and southward to northern Florida. There is also a European burning bush (*Evonymus Europæus*), which is commonly seen in parks and gardens; the fruit is similarly four-divided, but these divisions are somewhat flattened and angular; its color is a soft, *unvarnished* crimson, with a singular touch of ruddy orange—certainly a very odd combination of color. This shrub also expands to large proportions under favorable conditions. There is a very pretty specimen, perhaps 15 feet high, in the Public Garden, Boston. The burning bush is easily identified by its singular four-sided crimson or magenta berries scarcely half an inch in diameter. It is rare, too, that one finds a red berry of a *crimson* hue and without a glossy surface. In this respect, therefore, the fruit of the burning bush is quite unique. I know of two beautiful but small specimens which grow beside an arbor in front of a hotel in the White Mountains, New Hampshire, where they are exposed to rigorous winter weather with the mercury frequently falling to 25° below zero.

Sweet Viburnum.
Sheepberry.
Viburnum Lentago.

The sweet viburnum has a smooth, bright-green leaf about three or four inches long, closely and sharply toothed and sharp tipped; the rather long stem has a crinkly edge either side. Its ovate berry, blue-black in color with a bloom, ripens in autumn and is sweet and edible; it is about half an inch long, and is borne in red-stemmed clusters. The fine white flowers bloom in flat, broad clusters in May or June. The sweet viburnum is a small tree (it grows from 15 to 30 feet high), common in swamps, along streams, and in the woods, through a wide northern range extending all the way from Hudson Bay to northern Georgia and from the Atlantic States to southwestern Missouri and eastern Nebraska.

Sweet Viburnum.

Black Haw.
Viburnum prunifolium.

The black haw is a species of viburnum, with obtuse-pointed, dark-green leaves from one to two inches long; the stems are *not* crinkly on the edges. The flowers and fruit are similar to those of the foregoing variety. The fruit is also edible. The

Black Haw.

black haw is a very small tree, from 15 to 30 feet high; in the North it is oftenest a thickly branched shrub. It is common in dry soil or beside streams, and extends from southwestern Connecticut westward to Missouri and Indian Territory, and southward to Florida and Texas.

Arrow-wood.

Arrow-wood. *Viburnum dentatum.* The arrow-wood gets its name from the fact that its stems were used by the Indians to make arrows. The leaves are altogether different from those of the two preceding varieties; they are broadly ovate, sometimes slightly heart shaped, light green, strongly straight-veined, and the very prominent, sharp teeth resemble those of a small circular saw. Its fruit, a quarter of an inch long, is rich purple-blue in color. The arrow-wood is a small tree, or oftenest a shrub, which grows from 5 to 15 feet high; it is common in wet places from Maine to Minnesota, and extends as far south as northern Georgia.

CHAPTER XVI.

II. Simple Opposite Leaves.

2. With teeth. B. Edge divided.

THE MAPLES.

The maples are without doubt our *handsomest* trees in the largest sense of the word; no others can compare with them in the splendid coloring of their autumnal dress. What surprises our English cousins, on beholding for the first time a New England landscape in autumn, is the *brilliancy* of the foliage. More credit is due to the sugar and silver maples for this brilliant color than to all the rest of the trees put together. Scarlet in its purest tones, yellow in its clearest tints, golden orange with hardly a touch of rust—these are hues which the maples almost exclusively possess, and colors which are rarely seen in Old England.

Exclusive of its noble proportions, symmetry, abundant foliage, and broad shadows, the autumnal coloring of the sugar maple entitles it to the first

Mountain Maple.

place in our estimation as a *strikingly* handsome American tree. But some of its near relatives are almost as beautiful; not the least among these is the

Mountain Maple.
Acer spicatum.

mountain maple, which oftener takes the form of a tall shrub than it does that of a small tree. Its leaves are downy beneath; they are divided into three parts (rarely five), and the teeth are rather coarse; in autumn they turn a bright, deep, ruddy orange or red. Its spikelike clusters of greenish-yellow flowers appear in June. The seeds, with narrow wings diverging at an obtuse angle, are often a lovely tone of pale terra-cotta pink; finally they turn red. The mountain maple is common in the rich woods of the North, and among the mountains as far south as northern Georgia. It is most frequently found by shady roadsides or the banks of streamlets; its brown branches rarely rise over fifteen feet high, and as they have a common habit of growing in clumps, this maple is properly classed as a shrub; sometimes, however, it reaches a height of from 25 to 30 feet.

The mountain maple may be distinguished from a young red maple by the erect flower clusters, and the undeveloped condition of the leaves, if the time is June; later, by the three or five-divisioned leaves of soft texture and reflex curves, and also by the absence of the red color which characterizes the twigs

of the red maple, and in the fall by the seeds whose brownish wings diverge at fully a right angle.

Striped Maple.
Acer Pennsylvanicum.

The striped maple can be distinguished at once (especially in winter) by its vertically striped bark, and large, three-pointed, goose-foot-shaped leaves, which measure five or six inches in length. The bark is smooth, greenish, and is striped with a sort of rust color sometimes quite dark. The leaves are very finely and sharply double-toothed. Its flowers are greenish, and appear in May or June. The seeds have large, divergent, pale-green wings, and depend in long, graceful clusters.

Mountain Maple.

The tree is small and slender, never reaching a height of over 35 or 40 feet; it is common throughout the North, but is merely a shrub 15 feet high, beside the shaded roads which pass through the White Mountain district of New Hampshire; it reaches its greatest height in the Big Smoky Mountains in Tennessee, and extends no farther south than northern Georgia. I might call attention to this maple as having a leaf distinctly *unlike* those of its relatives; it is so large, thin, and delicately if not softly

Striped Maple.

modeled, that one is impressed by its sharp contrast with the rugged leaf of the sugar maple, when the two are placed side by side. A comparison of

Sugar Maple.

my drawings will show how widely the leaves differ in character.

Sugar or Rock Maple.
Acer saccharinum.
Acer barbatum.

The sugar or rock maple is the grandest member of the family. It sometimes reaches a height of from 100 to 120 feet. Its leaf is bold, and lacking in fine modeling, but that in no wise detracts from the symmetrical beauty of the dignified tree. The leaves generally have five divisions, the notches between which are *very* rounded; the teeth—if they can be called such, so very few and coarse are they—have blunt points. Compared with its "striped" relative, the sugar maple is a tree with foliage of a decidedly rugged character.

Sugar-Maple Seed.

The greenish-yellow flowers of this maple droop from very slender, hairy stems; they come in April or May, while the leaves are expanding. The wings of the seeds are about an inch long, and diverge something less than at a right angle; they are usually of a beautiful, pale yellow-green; the seed is ripe in September. The trunk is most frequently divided eight or ten feet from the ground into three or four stout, perpendicular branches. The leaf is smooth, dark green, and has an eggshell gloss; in the autumn it regularly turns a clear straw yellow on some trees, and a variety of toned light reds on

SUGAR MAPLE.

Campton, Grafton Co., N. H.

others; not infrequently it assumes a golden or an orange tint.* The bark of a young tree is smooth and gray, but on very old specimens it becomes deeply furrowed, scaly, and assumes a dark, gray-brown hue. The wood is yellowish white, and is extensively used in cabinet work; it is very hard.†

There is no more interesting tree in the woods in March than our much-prized sugar maple. At this season the farmer taps the tree (with a three-quarter-inch auger) for the sweet sap which the warm sunshine draws upward from its roots; and while the snow is yet lying on the ground, the evidences of a spring awakening are shown by the tree in the ceaseless drip of its watery blood into a tin pail suspended at its side. When the sap runs well, usually when the sun has warmed the tree in the middle of the day, about seventy drops fall in the pail every minute; it is a slow proceeding, but it continues relentlessly, until after three weeks or so the tree has yielded up its life blood to the extent

* The turning of maple leaves to unvarying hues each autumn is quite remarkable. For years, two trees I know of have resumed exactly the same colors: one, russet orange above and dull scarlet below, and the other yellowish rust color; even an individual branch will resume its own particular hue each fall.

† The so-called bird's-eye maple and curled maple are rare conditions of the wood, caused by undulations or deflections of its fiber.

of twenty-five gallons.* A large orchard in Vermont or New Hampshire will yield, in a good season, one thousand pounds of sugar, besides one hundred gallons of sirup, without injury to the trees.† In a small maple grove, which is near my summer home in the White Mountains, it has been my privilege to watch the effect of "tapping" on scores of trees for a period of twenty-five years—in fact, ever since childhood—and I can not say to-day that they seem to have lost any of their vigor; yet many a farmer has told me that the process eventually kills the tree. This, I find by experience, is entirely dependent upon the treatment it receives. There is a sensitive if not a human quality in a maple which responds to kindness, and rewards the care-taker with an abundance of sugar without injury to its own life. There are, however, careless and ignorant farmers who bore their trees in several places at once, or out of season, and as a consequence the exhausted trees die sooner or later, according to the measure of the abuse. To tap a tree in threatening

* One gallon of sap yields about three ounces of sugar. Few trees yield more than thirty gallons of sap, if the tapping is properly done, so the average production of sugar from a single tree is about five and a half pounds; but in many instances the average, I find, does not rise over four and a quarter pounds.

† On a large estate near Stamford, N. Y., the output of sugar in a season is five thousand pounds.

or stormy weather, or before the temperate genial warmth which is usually brought by the south wind, is considered by some sugar-makers an ill-advised proceeding; the weather must be neither too hot nor too cold to obtain the best flow of sap.

The methods employed to-day in the making of sugar are quite scientific compared with those in practice twenty years ago. A patent evaporator, with an infinite length of trough through which the sap flows,* now takes the place of the long pan over the bricked-in log fire. Also, in place of the wooden tap or spout for the tree, a new galvanized iron one (which does not clog up the pores) is in common use. The sap is evaporated to a certain point in the production of sirup, and it passes through a process of still greater evaporation in the making of sugar.† In my own judgment, the sugar made by the old-fashioned, boiling-down method possesses the high-

* The passage of sap through the trough to the necessary point of evaporation is about two hours. There is also a partitioned pan now in use, the principle of which is similar to that of the evaporator.

† One hundred eight-quart bucketfuls of sap are boiled about sixteen hours in the production of sirup, and about twenty hours in the production of sugar. The test is made by stirring and cooling some of the boiled sap in a saucer: if it granulates and adheres to the spoon and saucer the process is completed; also, some of the sap is dropped on snow or ice, and if this becomes "like glass," the proper point is reached.

est and best flavor; but in the market the super-refined, lighter-colored sugar made by the patent evaporators is of course considered much finer, and brings a higher price. The best sugar brings the New Hampshire farmer rarely more than eight cents per pound, and the sirup about sixty cents per gallon. The retail prices even in country towns is frequently over fifty per cent in advance of these figures.

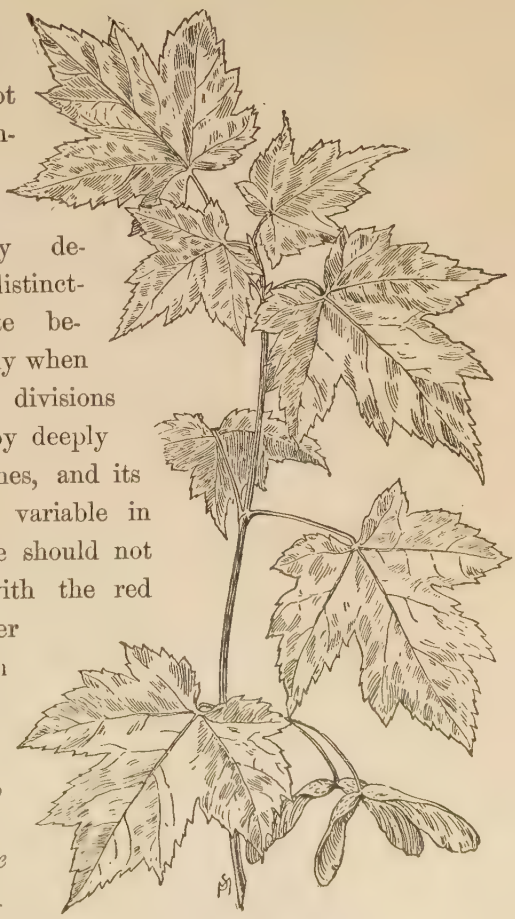
Black Sugar Maple.
Acer saccharinum, var. *nigrum.*
Acer barbatum, var. *nigrum.*

The black sugar maple is a variety of the common sugar maple, with no great distinguishing differences excepting that the leaf is often finely covered with down underneath; it usually has three lobes (leaf divisions) which are wider, shorter, and freer of teeth, and the sides of the clefts at the base of the leaf often overlap. The bark of the tree has also a blackish color, and the seed wings, set wide apart, only slightly diverge.

Black Sugar Maple.

Silver or White Maple.
Acer dasycarpum.
Acer saccharinum.

The silver or white maple has an extremely ornamental leaf, prettily divided and toothed, which could not possibly be confused with the leaves of the maples already described. It is distinctly silver-white beneath and downy when young; its five divisions are separated by deeply cut, sharp notches, and its teeth are very variable in size. This tree should not be confused with the red maple; the latter has a leaf which is characteristically three-lobed — that is, it impresses one with its *triple* aspect, even though we often



Silver Maple.

find a specimen with five lobes. Compare my drawings, and this difference of type will at once become apparent. The flowers, which precede the leaves, are light yellowish-lavender; the seeds follow some time in July; their wings are large, and set at right angles.

This maple I consider remarkable for its beautiful details; its branches are long, spreading, and frequently droop enough to deserve the term "weeping"—in fact, certain cut-leaved and weeping varieties are sold by the nurserymen. The silver maple is most common along river banks, and is found from Maine to western Florida; westward it extends to the Dakotas and Indian Territory. Its seeds, taking root in sandy river margins, quickly sprout, and before the summer is done the budding leaves contribute a delicate ruddy tint to the monotonous buff of the sand. It is a curious fact that dying leaves are often stained with the same ruddy hues in which they appeared at birth.

Cut-Leaf Silver Maple.

The silver maple grows to a height of from 90 to

120 feet, but commonly it does not exceed 50 feet. Its wood is soft, white, and of little value.

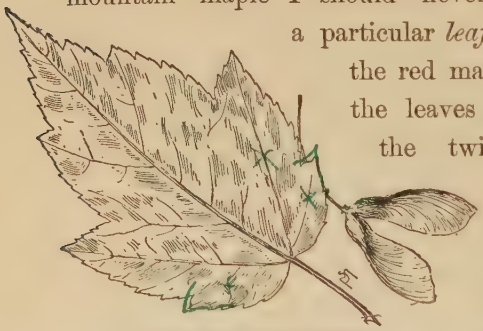
Red or Swamp Maple. *Acer rubrum.* The red or swamp maple, a tree common in swamps and wet woods, rarely attains a height of over 50 feet in the North, but sometimes measures 80 to 120 feet in the South. It may be distinguished by its reddish branches; the twigs of very young trees are bright, dark red.* The leaf, as I have already said, is characterized by three divisions, although one may frequently find specimens with the five points distinctly defined. The commonest type of leaf will be seen in the drawing marked Type A.

Red Maple. Type A.

I conclude also to give another common type which may frequently be seen in very young trees; this attenuated outline is confusingly near that of the mountain maple's leaf; but in presenting this type I do so to call attention to the fact that Nature does not follow cast-iron rules, however we mistake the botanist's descriptions as such. What we choose to

* The branchlets of the maples are apt to change color at different seasons: the red maple is brightest red during the winter; in summer the twigs become brown red.

call Nature's rules are really general principles characterized by a remarkable quality of elasticity. I have not yet found a botanist, to whom I had occasion to defer some difficult specimen, who did not preface his opinion with some reference to this elasticity. Now, in distinguishing the red from the mountain maple I should never rely wholly on a particular *leaf*. The flowers of the red maple much precede the leaves in early spring; the twigs are *red*, not brown, as in the mountain maple; the wings of the seeds only *slightly* diverge, and the leaf is whitish underneath, free from the down which characterizes the other maple (except, perhaps, at the junction of the veins), and it turns bright, deep red or orange in autumn.



Attenuated Leaf of Red Maple.

The drawing of the long, narrow leaf was taken from a young tree which grows in the White Mountains; that of the typical leaf was taken from an older tree in the Arnold Arboretum; and that of the three-lobed leaf represents a specimen belonging to a large tree at Plymouth, N. H.

The red maple is common throughout the North,

and extends southward to Florida and westward to the Dakotas and Texas; it is one of the very earliest trees to blossom in the spring, when it assumes a ruddy hue by reason of the red flowers; in autumn its rich red foliage again demonstrates the right of the tree to its name; even the hard wood has a reddish tinge at times, and with a "curled" grain it is considered peculiarly handsome in cabinet work.

Red Maple.
Three lobed leaf.

I have drawn a leaf of the beautiful Norway maple (*Acer platanoides*) so that we may compare it with that of our own sugar maple; the shapes are very similar. Notice the extremely divergent seed wings which are characteristic of this tree. It is a handsome maple, very round in outline, and is easily distinguished by the milky juice which is best seen at the base of the young leaf. It is becoming very common in our Eastern cities. My drawing was taken from a tree which grows in Roxbury, Mass. *Acer palmatum* is a beau-

tiful dwarf variety of the maple which comes from Japan; it is not infrequently seen in our city parks. The leaves of some of these Japanese maples are so slashed and rent that they hang like a fringe from the twigs. *Acer macrophyllum* is a Californian species, with a huge leaf eight to twelve inches broad, and yellow, fragrant flowers which bloom after the leaves have expanded. The tree is very large, sometimes reaching a height of 100 feet. It is not hardy north of 40° north latitude.

Norway Maple.

For ash-leaved maple (*Acer negundo*) see Chapter XIX.

CHAPTER XVII.

III. Compound Alternate Leaves.

1. Without teeth. Leaflets bordering main leaf stem.

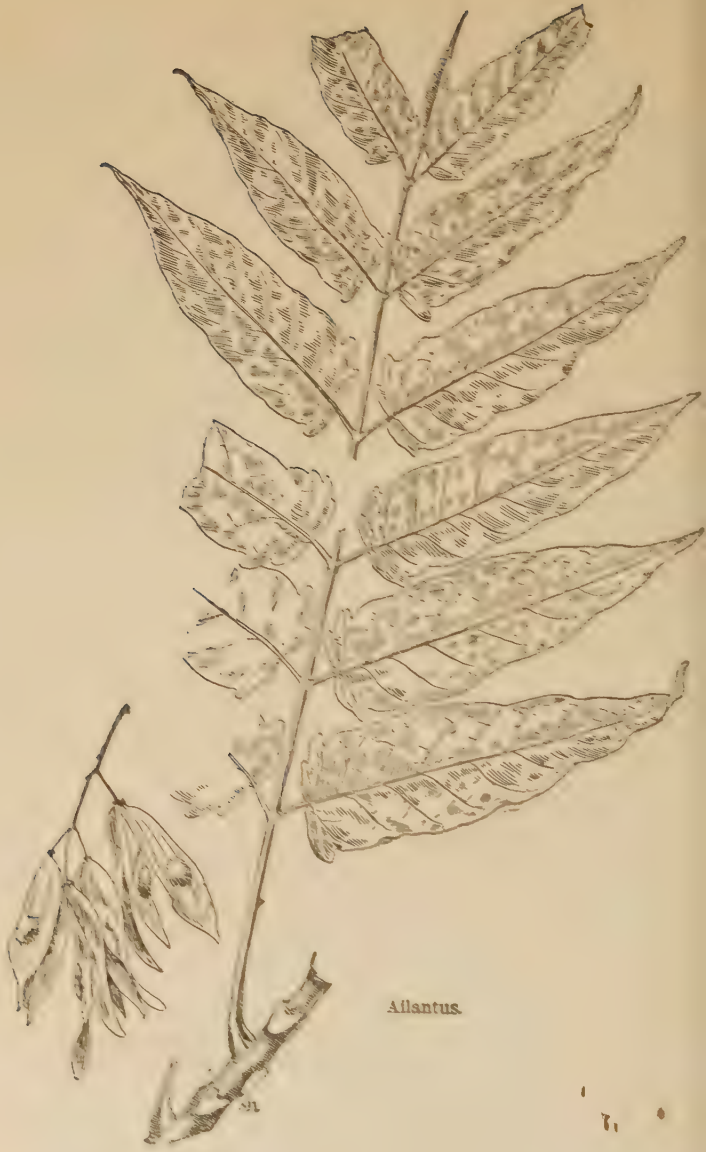
THE AILANTUS AND LOCUSTS.

Ailantus.
Ailanthus glandulosus.
Ailanthus glandulosa.

The ailantus,* familiar to us all through its greenish flower clusters, which have such an offensive odor in the balmy days of June, comes from China, and is called there "The Tree of Heaven"! Fortunately, not *all* the trees are disagreeable, as some do not bear the ill-smelling, sterile (staminate) flowers.

The ailantus was first brought into the United States by Mr. William Hamilton in 1784, and a sucker from the original tree, planted in 1809, developed to large proportions, now stands in the Bartram Botanic Garden. In 1820 Mr. William Prince, of Flushing, L. I., imported the ailantus from Europe, and from this stock most of the trees

* "Commonly, but improperly, spelled *ailanthus*."—*Webster*. But I do not interfere with the spelling of the established botanical names.



Aillantus.

around New York have originated. In Washington Square and its vicinity during the "sixties" there were innumerable trees, which eventually became so offensive because of their odor and liability to be attacked by the abominable brown "inch-worm" * that most of them were cut down.

But the tree in appearance is very graceful; its compound leaves have stems frequently measuring three feet in length; the base of the stem where it joins the branch is swollen so that it resembles in shape a miniature horse's hoof. The leaflet is sharp-pointed, and has two or more singular dull teeth at the base. The winged seed clusters, which somewhat remind one of seaweed, are often beautifully pink-tinged, but generally pale green. The tree is inclined to spread from seed, and in rubbish heaps and the cracks and crannies of areas around old city houses we may frequently see its youthful, fuzzy, light-brown stem and a cluster of graceful leaflets. The tree is distinguished in the absence of its leafage by its *coarse*, *blunt* twigs; these do not possess the delicacy which characterizes those of most other trees.

* I believe the advent into this country of the English sparrow put an end to the "inch-worm" years ago.

Yellowwood.
Cladrastis tinctoria.
Cladrastis lutea.

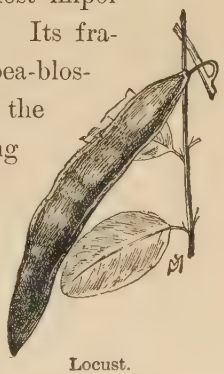
The yellowwood is rather a rare tree, reaching a height of about 40 feet, with yellowish wood, smooth bark resembling that of the beech, long, beautiful, light-green leaflets, and delicately fragrant, cream-white flowers which bloom in June; these hang in graceful clusters a foot or more in length. The pods, which are two inches long, are ripe in the latter part of August. The tree is found wild in Kentucky and Tennessee, but is a much more familiar object in parks and gardens. Its resemblance to the locust bespeaks a close relationship with the latter tree. There is a beautiful specimen of this tree at Dosoris, L. I., and another in the Phœnix Nursery, Bloomington, Ill.

Yellowwood.

One of the most beautiful and symmetrical yellowwood trees I have ever seen is on the grounds of the

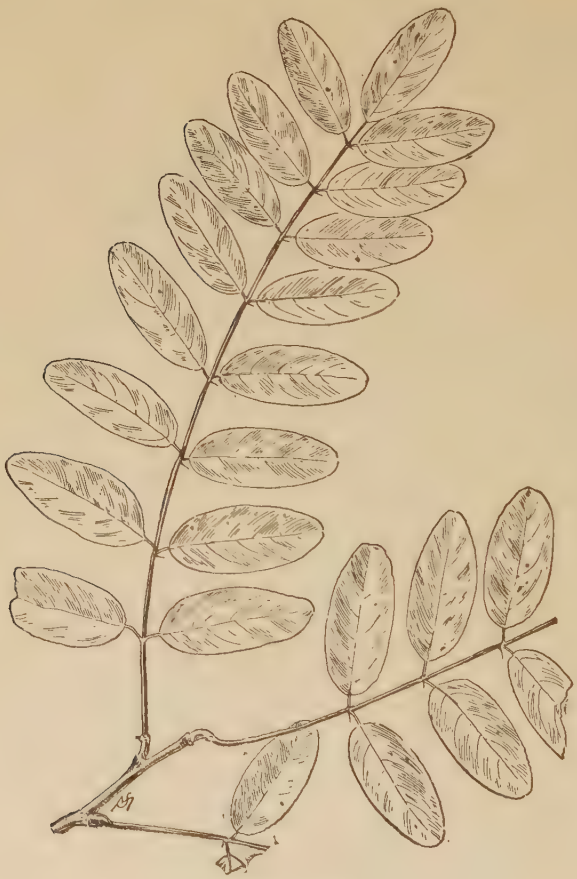
late Andrew S. Fuller, at Ridgewood, N. J.; it was his favorite tree, and is 45 feet high.

Locust. *Robinia Pseudacacia.* The common locust has a pretty leaf spray of from nine to twenty-three roundish long leaflets which are devoid of teeth. Its twigs are *not* sticky—that is the most important thing to remember about it. Its fragrant white flowers, shaped like pea-blossoms, hang in loose clusters from the sides of the branchlets in late spring or early summer. The flat pods, about two or three inches long, are smooth, of a purplish-brown color, and are ripe in September. The tree is slender in figure, and reaches a height of from 35 to 80 feet, according to its situation and circumstances. Its exceedingly hard and durable wood has a yellowish color and smooth grain; it is used for posts and exterior construction intended to withstand dampness. The tree is common throughout the eastern United States.



Locust.
Robinia Pseudacacia.

Clammy Locust. *Robinia viscosa.* The clammy locust differs from the common locust in the following particulars: the tree is never over 40 feet high, its dark-brown twigs are very sticky, and its rather upright flower cluster is a trifle pinkish, and nearly if not



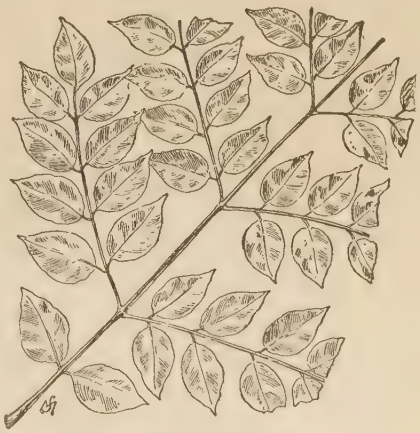
Clammy Locust.

quite without perfume. The tree is found in the mountains from Virginia to Georgia, and in the North, where it is common in cultivation, it has

frequently escaped to roadsides and the borders of fields. I find it quite common in Campton, N. H., on either side of a road which passes a large cemetery, where there are several handsome trees over 35 feet in height.

Kentucky Coffee Tree.
Gymnocladus Canadensis.
Gymnocladus dioicus.

The Kentucky coffee tree is tall, and has coarse bark extending over the limbs, stout branchlets like the ailantus, and leaves which are unequally twice-compound; the leaflets are rather broad and sharp-pointed. This doubling up of the compound character of the leaves is the sure means by which we may recognize the tree. My sketch, somewhat conventional in arrangement, reveals the leaf system at a glance. The whole spray is from two to three feet long; the leaflets are without teeth, and are dull, dark green. The brown, curved pods are two inches broad, and from six to ten inches long; they contain hard, gray seeds half an inch in diame-

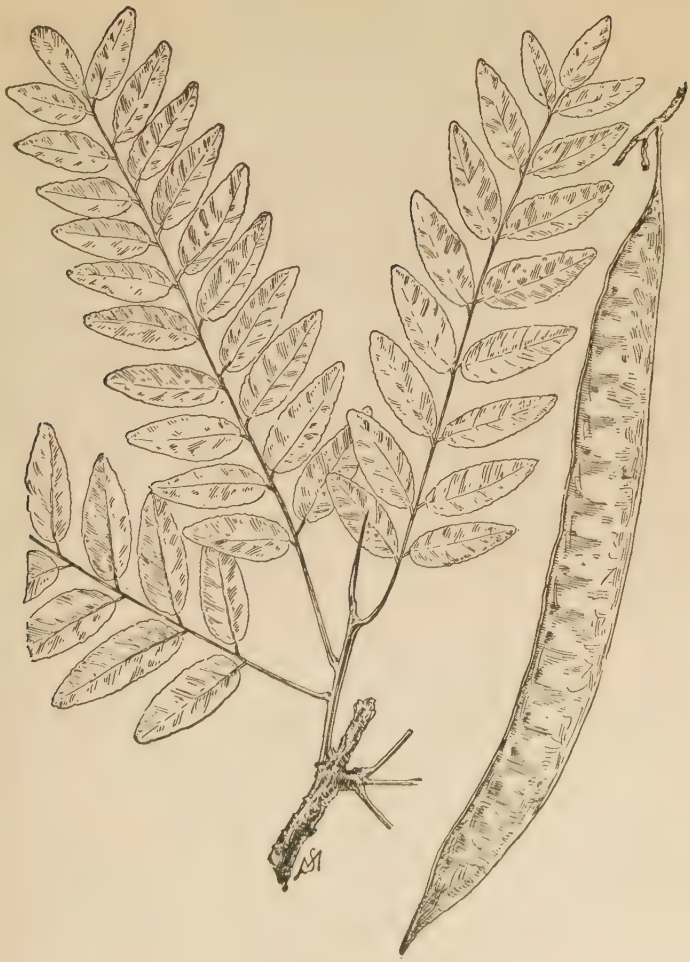


Kentucky Coffee Tree.
Portion of double compound leaf.

ter, which are ripe in October. The tree grows from 45 to 80 and occasionally 110 feet high, and has few branches. In the South its seeds were at one time used as a substitute for coffee. In the Public Garden, Boston, not far from the path leading to Newbury Street, there is a very handsomely proportioned but rather small specimen perhaps 40 feet tall. The Kentucky coffee tree is a native of rich woods, and is common from western New York to Minnesota and Arkansas.

Honey Locust.
Gleditschia triacanthos.

The honey locust is a tree which boys do not care to climb, for an obvious reason; its murderous-looking thorns, which grow on the trunk in formidable bunches, are altogether too threatening for the average juvenile climber. The leaves are sometimes twice compound, but not very often; they suggest a sort of toothed edge, but so indistinctly that the fact would escape notice unless the leaflet was subjected to close scrutiny. The inconspicuous and greenish-colored flowers appear in short spikes in early summer; the long, red-brown, straplike, twisted pods ripen in late autumn, and contain most remarkably hard, shiny brown, flattened seeds; the pod is filled between the seeds with a greenish-yellow, sweet pulp much relished by the "small boy," who respects the tree's defenses, and waits for the fruit to drop.



Honey Locust.

The tree is very large, and with its graceful, fine foliage presents a handsome appearance in midsummer. Along the river banks of Illinois it frequently attains an altitude of from 80 to 90 feet.* It is a quite rapid grower, and a seedling will reach a height of 18 or more feet in ten years. In the North the leaves unfold about the middle of May.

The honey locust grows wild from Pennsylvania southward to northern Alabama and Texas and westward to eastern Nebraska. There are two varieties frequently found in parks and gardens: var. *inermis*, without thorns, and var. *Bujotii pendula*, with exceedingly graceful, drooping foliage.

Water Locust. *Gleditschia aquatica.* The water locust is a much smaller tree than the honey locust, but its general character is the same; it usually attains a height of 30 feet, and rarely 50 or 60 feet. Compared with the other locusts its leaflets are smaller, its thorns are less branched and more slender, and the pod is very short (two inches long), rounded, and contains rarely more than one seed, and no sweet pulp. It is found in the swamps of southern Illinois and Indiana and southward, but is frequently planted in the North for ornament.

* Prof. Sargent records its maximum height at 140 feet.

CHAPTER XVIII.

III. Compound Alternate Leaves.

2. With teeth. Leaflets bordering main leaf stem.

THE SUMACH, WALNUTS, HICKORIES, ETC.

Stag-horn Sumach. *Rhus typhina.* The stag-horn sumach is a rugged-looking shrub or tree from 10 to 30 and occasionally 40 feet high, with milky juice and remarkably ruddy, velvety twigs and branches, by means of which it may readily be identified. Notice how the beautiful compound leaves (composed of from eleven to thirty-one leaflets, very pale beneath) are gracefully set around the smaller branches so that each is out of its neighbor's way and does not obstruct sunlight; they change from a lively light green in August to a most beautiful scarlet red in September. The pyramidal fruit cluster reveals a curious, red-haired character under the magnifying glass, and its effective red-maroon patch of color gives the tree a most picturesque appearance in later summer. The graceful, drooping effect of the leaflets, and the bold,

tortuous ramifications of the upper branches place the tree in sharp contrast with its surroundings; it grows beside almost every road in the Northern States, and extends southward along the Alleghany Mountains to Alabama. In autumn I know of no other tree which clothes itself in a color so nearly approaching pure scarlet, and there is no wood of any other tree which seems to me quite so green - yellow. Gray calls it orange-colored, but it is rather that peculiar citron hue which may be produced by mixing orange and green; a daub of this color from my paint brush exactly matches the wood, but anoth-

Stag-horn Sumach.

er of orange cadmium is in strong contrast with it. In the Catskill Mountains sumach wood is used by the turners in making walking sticks, boxes, and a variety of ornamental knickknacks. It is a pity the tree does not grow sufficiently large to furnish wood available for cabinet work.

The stag-horn sumach, common throughout the North (its southern limit is northern Georgia), is too familiar an object on our byways and hillsides to need any leaf description here, and I would rather call attention to it as one of our most beautiful, picturesque, but unappreciated roadside characters, whose brilliant coloring in autumn is unexcelled even by the maple. We must not confuse it with the vicious poison sumach (*Rhus venenata*),* whose leaflet is *without teeth*, and whose fruit is a greenish-white berry about the size of a pea.

The smoke tree (*Rhus cotinoides*)† is a small tree from 25 to 40 feet high, which is a near relative of the sumach, but which is quite out of place here in this division of my leaf classification, for it has a *simple, plain-edged* leaf, oval, thin, and smooth, or nearly so; it measures from three to six inches in length. Usually most of the flowers are abortive,

* Also called *Rhus vernix.—C. S. Sargent.*

† Also called *Cotinus Americana.—C. S. Sargent.*

Mountain Ash.

while their stems lengthen, branch, and bear long, plumy hairs, making large, light, and feathery or cloudlike bunches, either greenish gray or ruddy tinged.* The smoke tree grows wild from Missouri and Tennessee southward. It is rarely cultivated.

Mountain Ash. *Pyrus Americana.* The beautiful mountain ash†—which is, of course, no ash at all, but a charming relative of the apple and pear—has a conventional, compound leaf, which would lead one to suppose (if superficial appearances counted for anything) that it was related to the sumach. This is not the case, however, and a comparison of the characters of the two plants shows wide differences. The sharply toothed leaflets, thirteen to seventeen on a stem, are nearly if not perfectly smooth, as well as the stem itself and the branchlets. The berries are bright red, about the size of peas, and they appear in their richest coloring, great flat clusters of them, in the latter part of September. They remain on the branches into the winter. The grooved leaf stem in the early autumn often assumes a bright-red hue, and the trunk bark is a dull, raw umber brown; when it is cut or bruised it smells like that of the wild black cherry—not so surprising, in view

* *Vide* Field, Forest, and Garden Botany, Gray.

† Sometimes called the rowan tree.

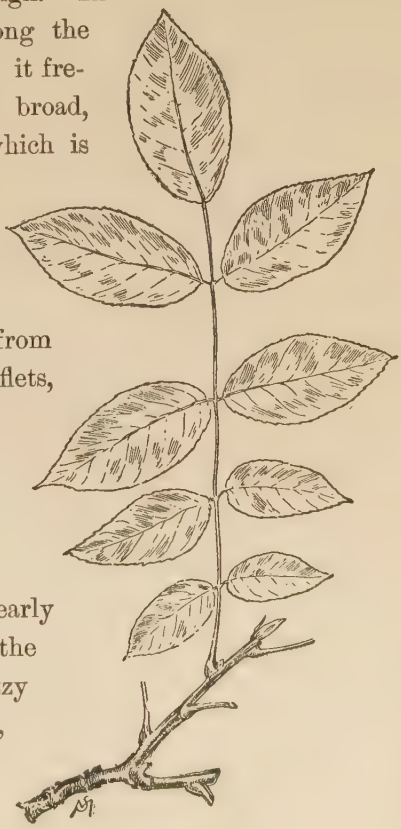
of the fact that the latter tree is a family relation.

This slender and graceful tree, which grows from 15 to 30 feet high, is common in swamps and cold mountain woods throughout the Northern States from Maine to Minnesota; southward it follows the Alleghany Mountains to North Carolina. It is very frequently seen in the vicinity of Lake George, and on the higher peaks of the White Mountains, and I found it at every step beside the steep path which ascends Mount Cannon, in the Franconia Notch. In the struggle for existence at an altitude of three thousand five hundred feet it did not attain a height of over 4 feet. The elder-leaved mountain ash (*Pyrus sambucifolia*), found also in the higher mountains of the northern part of New England and westward to Lake Superior, has more obtuse and abruptly sharp-pointed leaves, usually double-toothed. The berries are larger but the clusters are smaller than those of the other variety.

Butternut. *Juglans cinerea.*

The butternut, sometimes called oil nut, is very common in New England and the extreme Northern States; it extends westward to the eastern Dakotas, eastern Nebraska, and northeastern Arkansas, and southward to Delaware and through the Alleghany Mountains to Georgia. I can hardly call it a beautiful tree, as its foliage is

sparse, its rough, gray limbs are scraggy, and its figure lacks symmetry. It grows from 30 to 50 and occasionally 100 feet high. In the pasture lands among the hills of New Hampshire it frequently attains a tall, broad, and imposing figure, which is often unfortunately marred by gaunt, dead branches.

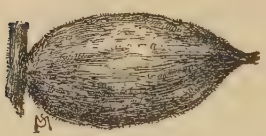


Butternut.

The compound leaves are composed of from nine to seventeen leaflets, which are rather unevenly toothed and fuzzy-stemmed; the base of the stem is conspicuously horse-hoof-shaped. In the early part of the season the branchlets are very fuzzy and sticky. The fruit, two to three inches long, is at first downy, green, and sticky; on being bruised it stains the fingers a deep yellow. The nut

is ripe in October, when the husk is black brown; it is sharply rough, and the kernel, greatly relished by the squirrels, is sweet but very oily.

The butternut is one of the first trees to lose its leaves in the fall. After a heavy night frost in early October, on the following morning one will see the leaves, stem and all, silently drop one after another, until in the course of the day the branches are almost completely stripped of their foliage. The leaves turn a bright yellow not long before they fall. In summer the general effect of the tree is yellowish green, and in spring the late-arriving, green-yellow, budding leaves combine with the gray bark of the branches in forming a most peculiar but beautiful combination of color.* The hard, strong-grained, beautiful, light yellow-brown wood makes a handsome interior finish, and is highly esteemed by the cabinetmaker.



Butternut in husk.

Black Walnut. *Juglans nigra.* The black walnut is esteemed so highly for its rich, dark-brown wood, that in recent years woodcutters have made it very scarce. It is claimed that one hundred years are re-

* In March the tree is often tapped with the sugar maple, but I know nothing of the quality of the sugar which is made. I am told that it has some medicinal properties.

BLACK WALNUT.

The Hedges, Bucks Co , Penn.

quired for this tree (in the forest) to attain a sufficient size to make it valuable for timber; yet in twenty-five years' time its destruction has steadily proceeded until it has been almost exterminated in the Mississippi basin, and vast tracts of forest land have been bereft of nearly every specimen considered valuable for its timber. I am told by a gentleman who is connected with the lumber interest of this country that individual valuable trees are bought "on the stump" by the lumber companies in all accessible forest regions.

Black Walnut, portion of leaves.

The black walnut is found from western Massachusetts to central Nebraska and eastern Kansas, and it extends southward to western Florida and Texas. It was once very plentiful in the forest regions west of the Alleghany Mountains, where it attained its largest growth. There are a few large specimens in Massachusetts,

one of which, at West Medford, has a trunk circumference of about fourteen feet at five feet above the ground; another, at Saugus (Centre Village), measures 60 feet in height.

The compound leaf is composed of from fifteen to twenty-three sharp-toothed leaflets on a stem (without the horse-hoof base) which measures one to two feet in length. The leaf* is thin, bright yellow green above and somewhat downy beneath; it turns yellow in autumn. The splendid, large fruit is rough, dull green, and generally round; it has a pleasant, aromatic odor. The nut, after the ripened blackish husk is removed, reveals a dark-brown, sharply cut, rough, hard shell; the kernel has a delicate but decided flavor.

The English walnut (*Juglans regia*) is sparingly cultivated in this country, but it is barely hardy in the North. It has from five to nine ovate, pointed, unevenly toothed leaflets which crowd the stem, and a thin-shelled nut which the husk, becoming brittle and open, soon sheds. The nut is the common Madeira nut of commerce. The tree grows from 35 to 60 feet high.

* I am told that in Bucks County, Pa., the leaves are often stripped from the tree by caterpillars; in the White Mountains the trees are remarkably free from them; probably a winter temperature of 30° below zero is a trifle too strong for some worms.

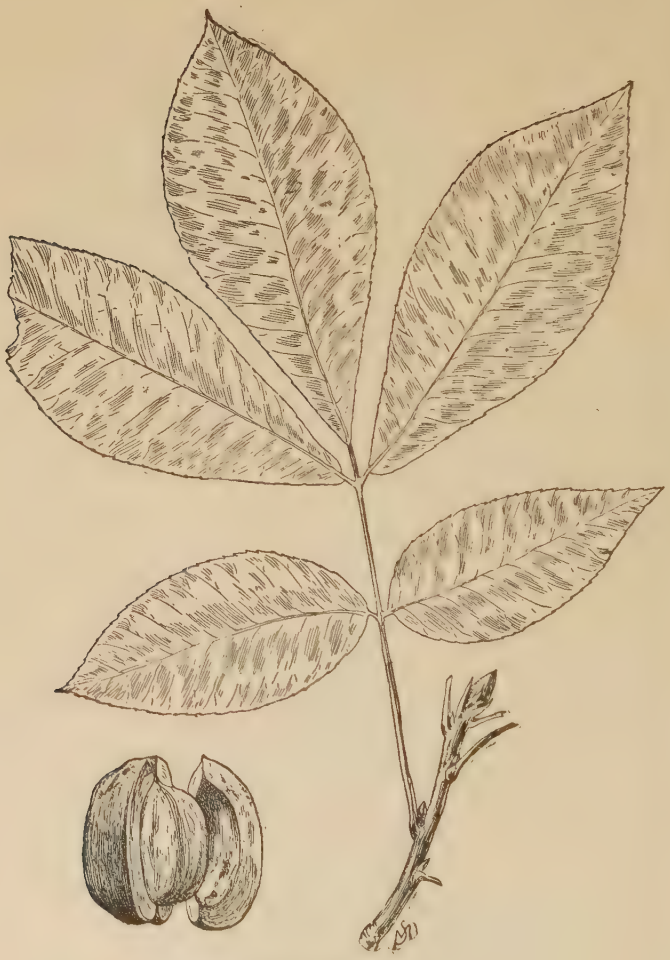
HICKORY OR SHAGBARK.

Near Boston, Mass.

Hickory or Shagbark.
Carya alba.
Hicoria ovata.

The hickory, sometimes called shagbark or shellbark, is a tall, spreading tree 70 to 90 and occasionally, in the forest, 120 feet high. It usually has a straight trunk with gray bark loosely attached, which hangs in strips nearly a foot long and six inches wide; the ends of these strips frequently curve away from the trunk, and give it the rugged appearance which accounts for the name "shagbark." The younger branches are smooth and light gray. As a rule, there are but five sharp-toothed leaflets on a stem (sometimes there are seven), and these are from four to eight inches long; they are rather thin, and dark yellowish green; the leaf stem is rough, and somewhat enlarged at the base. The fruit, which is ripe in October, has a thick, hard husk, which splits into four separate sections; the whitish nut, slightly flattened at the sides, has a thin wall, and a large, sweet kernel which I consider superior in flavor to any other American nut.

This hickory is the commonest of the species in the North; it extends from Maine to central Minnesota and southeastern Nebraska; southward it follows along the Alleghany Mountains (on their western slopes, and in the Ohio basin it attains its largest size), and reaches its limit in western Florida and Texas.



Shagbark Hickory.

The brownish-white wood is exceedingly tough and hard, and is much used in the manufacture of carriages, agricultural implements, axe handles, and farm wagons. The handsome, clear green foliage and the symmetrical proportions of the shagbark hickory make it an impressive tree of exceptional beauty. There is a most stately and picturesque tree, over 50 feet high, on the land of Mr. Augustus Fowler, at Danvers, Mass.

Big Shellbark.

Carya sulcata.
Hicoria laciniosa.

The big shellbark differs from the foregoing species in the following particulars: There are usually seven leaflets (sometimes there are nine) which are more downy and of a bronze-green hue beneath; above, they seem to me to be a deeper green. The young branchlets are somewhat orange-colored. The nut is much larger (from an inch and a quarter to nearly two inches long), and it is usually pointed at both ends. The strips of bark are narrower. This hickory is rather rare and local, and extends from Bucks County, Pa., and central New York westward to Missouri and Indian Territory.

Big Shellbark, a leaflet; nut showing sharp point at the base.

Mockernut.

Carya tomentosa.
Hicoria alba.

The mockernut is a tall, slender tree from 70 to 100 feet high, with light gray, close bark which does *not scale off*. There are from seven to nine blunt-toothed leaflets on a stem, which are deep yellow green above and somewhat paler and rough downy below; they are very fragrant when bruised. The large, thick-shelled, brownish nut has a thick husk which splits nearly to the base when it is ripe; the kernel is small and indifferently flavored. Probably the tree gets its name from the outward promise of the nut, which the small kernel fails to fulfill.

Mockernut in husk and a leaflet.

The mockernut is found on ridges and hillsides from New England southward to Florida and Texas; westward it extends to eastern Kansas and Indian Territory; it is common in the South, but rather local and rare in the North.

Pignut.

Carya porcina.
Hicoria glabra.

The pignut, sometimes called broom hickory,* is a gracefully proportioned tree from 60 to 90 and occasionally

* It is said that the early settlers used the wood split into thin, narrow strips for brooms.

Pignut.

120 feet high. Its sharp-toothed leaflets grow from five to nine on a stem (usually seven, and rarely nine); they are smooth above and below, but sometimes tufts of pale hairs will be discovered at the angles of the ribs; the leaf color is a rich, deep, yellow green. The fruit has a very thin husk, and is somewhat pear-shaped or else oval; the husk often splits open only at the apex, and falls with the nut to the ground. The kernel is at first sweet, then afterward bitter. The fruit from which my drawing was made measured scarcely one inch in length; not infrequently, however, larger specimens are found.*

The pignut is distributed from Maine to southeastern Nebraska, southward to Florida, and along the Gulf States to Kansas and Texas. It is very common on hillsides and dry ridges in all the Northern States.

Small-fruit Hickory. *Carya microcarpa.* *Hicoria glabra*, var. *odorata.* The small-fruit hickory bears a small nut with a thin husk which splits open nearly to the base; the smooth-shelled nut is roundish and *free from angles*; in some instances it is hardly more than half an inch deep. The kernel is very sweet.

There are usually five (often seven) leaflets on a

* In the Silva of North America, Prof. Sargent says *Hicoria glabra* varies more in the size and shape of its fruit than any other of the hickories.

stem; they are fine-toothed, and very smooth above and below, except that the angles of the ribs are apt to be a trifle fuzzy. This hickory (considered by Prof. Sargent a variety of the foregoing species) grows from 60 to 90 feet high, and is found from eastern Massachusetts to Delaware, and from New York westward to central Michigan, southern Illinois, and Missouri. The bark is somewhat shaggy but separates in narrow, thin plates.

Bitternut, or Swamp Hickory.
Carya amara.
Hicoria minima.

The bitternut, or swamp hickory, is a large tree with spreading limbs, which is found in low, wet woods and swamps; it grows from 50 to 75 and occasionally 100 feet high. There are from seven to eleven narrow leaflets on a slender stem; these are smooth on both sides, or very slightly downy beneath, especially when young. The fruit is roundish, and the rather soft, thin husk separates down to about the middle; the thin-shelled, whitish nut is depressed at the top, and has an extremely bitter kernel, which was at first sweet. The husk and nutshell are thinner than those of the

Bitternut, portion of leaf.

other species, and they may be broken with a very slight blow.

The swamp hickory is distributed from Maine to Minnesota and southeastern Nebraska; southward it extends to Florida and eastern Texas. The bark of the trunk is rather smooth and close.

Pecan Nut.
Carya olivæformis.
Hicoria pecan.

The pecan nut is a Southern species of hickory, which grows from 80 to 100 and occasionally 170 feet high. There are from nine to fifteen leaflets on a stem; these are finely toothed and slender-pointed, and of a warm, deep yellow-green color. The fruit, about an inch and a half long, has a thin, yellow-haired husk which splits in four sections nearly to the base, and, discharging the nut, not infrequently remains on the branch through the winter. The smooth, thin-shelled nut has a very sweet kernel, and is considered by many the best flavored of all nuts, native or foreign.

Pecan Leaflet.

The tree is a rapid grower, and it will produce a small amount of fruit at the end of its eighth or tenth year. It is the largest of the hickory trees, and grows in rich soil in the neighborhood of streams from Iowa, southern Illinois and Indiana to Louisiana and Texas; it also extends into

central Mississippi and Alabama. Most of the nuts in the market come from Texas, but of late years orchards of selected varieties of the pecan nut have been planted in many of the Southern States.* It is one of the most imposing and beautiful trees of the South.

Pecan nut in husk.

* *Vide* Silva of North America, C. S. Sargent.

CHAPTER XIX.

Compound Opposite Leaves.

With or without teeth. Leaflets bordering main leaf stem.

THE ASH-LEAVED MAPLE AND THE ASHES.

THERE are odd trees as well as odd people in the world, whose characters are problems somewhat difficult of solution. A man can tell who he is, but a tree only reveals its individuality by certain *little* differences which distinguish it from others of its kind. When these differences assume a contradictory aspect, we are put to some confusion. "From your speech," said one traveler to another, guessing at the latter's nationality, "I judge you are an Englishman; from your carriage and quickness of perception, I imagine you are an American; but your physiognomy bespeaks a German nationality." "Not right," said the other; "for my mother was Dutch, I was born in Paris, reared and educated in Boston, and the last three years of my life have been spent in London." One of the maples is quite as problematic in its outside appearance.

Ash-leaved Maple or Box Elder.

Negundo aceroides.
Acer negundo.

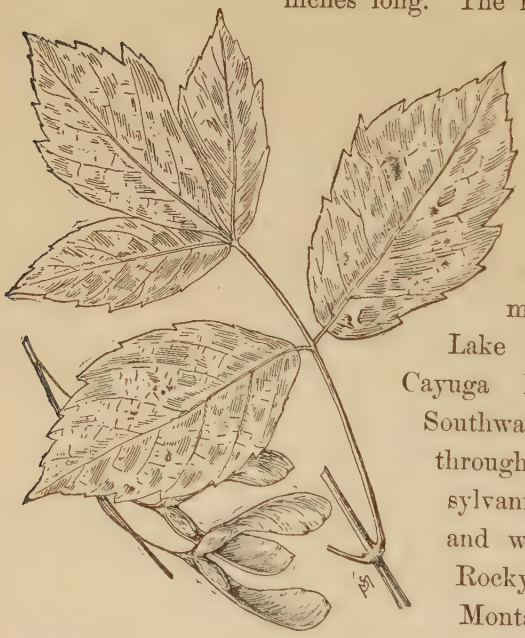
Where or how the ash-leaved maple spent the first years of its existence nobody knows. The tree can not account for itself, but that it has puzzled more than one botanist its various names assuredly testify. Some one has thought it looked sufficiently like the elder to name it box elder.* Another has seen the strong resemblance of its foliage to that of the ash, and named it ash-leaved maple; and, finally, Prof. Sargent (following Michaux's initiative) has sifted the qualifying *aceroides* down to plain *Acer* †—a common-sensible conclusion, it seems to me, if one will look at the perfectly plain family signature, the double-winged seed.‡ "By their fruits ye shall know them." This really ought to be the text of one who is in search of the real character of a tree; we can tell a great deal about that by the leaves, but when there is a shadow of doubt we must turn to the fruit. The leaf of the ash-leaved maple has three or five slightly rough, strong-ribbed leaflets, the outer edges of which are irregularly and coarsely

* Michaux says this name was commonly used in the Carolinas, so he adopted it also, although it was without any particular significance.

† Which is the name given by the younger Michaux.

‡ My expressed opinion is, perhaps, presumptuous; it is simply a case of *ipse dixit!* Many of the botanists believe that *Negundo aceroides* is essentially different from the genus *Acer*.

toothed. The fruit ripens in early summer, and hangs in graceful yellowish-green clusters from six to eight inches long. The newer twigs are a beautiful pea green.



Ash-leaved Maple.

This tree is found from the Winooski River, Vt., and the Vermont shore of Lake Champlain to Cayuga Lake, N. Y. Southward it extends through eastern Pennsylvania to Florida, and westward to the Rocky Mountains in Montana, the Wahsatch Mountains in Utah, and western Texas.

The ash-leaved maple is a handsome, rapidly growing tree with wide-spreading branches, which sometimes reaches a height of 70 feet; usually it is from 30 to 50 feet high. The foliage is deep green and very ornamental. It is said to be not long-lived, as it arrives at maturity in fifteen or twenty

years.* There are specimens of this tree on the Schuylkill River and in the vicinity of Philadelphia which measure 50 feet in height, and have a trunk circumference of four feet.

White Ash. *Fraxinus Americana.* The white ash is one of the noblest of our forest trees, and one which is second only to the oak in value for its timber. This stately tree measures 60 or 70 and sometimes 100 or 120 feet in height. In the forest its rather slim upright branches usually reach far above those of its neighbors. Its compound leaf (eight to twelve inches long) is composed of from five to nine (usually seven) leaflets; these are deep green, smooth above, and pale, silvery green below, with a trifle of down on the ribs; the teeth are very indistinct, or else the leaf edge is quite unbroken. The leaf stem is smooth and grooved, and the leaflet stems are quite a quarter of an inch long. The tall, heavy trunk on large specimens is gray, with deep intersecting furrows which cut the bark into short ridges.

The ash is one of the latest trees to unfold its leaves in the spring, and in autumn, after the first severe frost, they blacken and fall to the ground;

* *Vide* Trees and Tree-Planting, J. S. Brisbin. But I am inclined to doubt this. A box elder I know of over twenty years old, still shows signs of development.

this, however, is after they have turned a soft yellow somewhat modified by spots of persistent green.

White Ash.

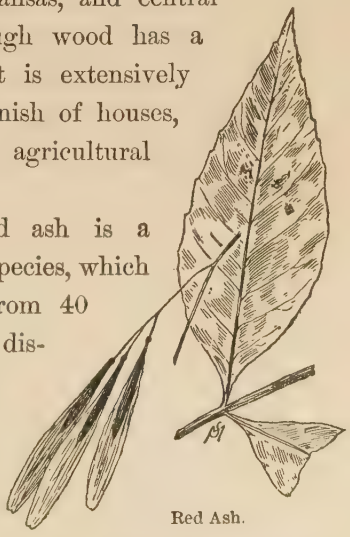
The winged seeds are dainty, narrow, wedge-shaped little things about an inch and a half long. They

hang in loose clusters, and frequently remain on the bare branches until the middle of winter.

The ash is a rapid-growing tree, which in thirty years from the time of planting will attain a height of 40 feet and a trunk diameter of sixteen inches. It is distinctively an inhabitant of the forest, and it likes rich, moist, cool soil. It is found from New England to northern Minnesota; southward it extends to northern Florida, and from there westward to Indian Territory, Kansas, and central Texas. The hard, tough wood has a handsome grain, and it is extensively used for the interior finish of houses, for furniture, carriages, agricultural implements, and oars.

Red Ash.
Fraxinus Pennsylvanica.

The red ash is a smaller species, which grows from 40 to 60 feet high, and is distinguished by the *velvety hairiness* of its leaf stems and branchlets. From seven to nine leaflets grow on the slightly grooved stem; they are indistinctly toothed, light green above and pale green below, covered with downy hairs. The seed is rather blunt-tipped.



Red Ash.

Probably the red ash owes its name to the ruddy color on the inner surface of the rough outer bark on the branches; but I have also noticed that the very young shoots have a decidedly ruddy or rusty colored downy surface.

The red ash is found in low, rich, moist soil from Maine to eastern Nebraska and the Black Hills of the Dakotas; southward it extends to northern Florida and central Alabama. West of the Alleghany Mountains the tree is less common and smaller than it is in the East.

Seed of the Green Ash.

Green Ash.

Fraxinus viridis.
Fraxinus Pennsylvanica, var. *lanceolata.*

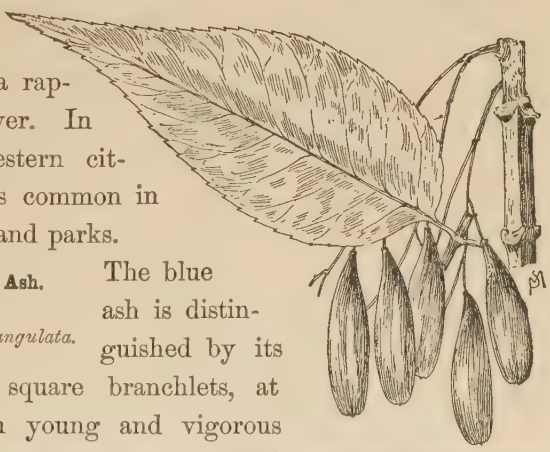
The green ash is considered by Prof. C. S. Sargent a variety of the foregoing species. The branchlets, leaves, and stems are quite smooth, without any downiness except a very slight amount sometimes found in the angles of the ribs on the under side of the leaflets; there are five to nine of these, and they are distinctly toothed and somewhat narrowed at the base; the color is bright green above and a very slightly paler green below.

The green ash is distributed from the eastern shore of Lake Champlain through the Appalachian region to northern Florida, and throughout the

West.* It rarely attains a height of more than 30 or 35 feet. Its beautiful deep-green leaves, nearly the same color on either side, make it a handsome and ornamental tree deserving more extensive cultivation, particularly as it is a rapid grower. In the Western cities it is common in streets and parks.

Blue Ash.
Fraxinus quadrangulata.

The blue ash is distinguished by its rather square branchlets, at least on young and vigorous shoots, so says Gray; but I do not find that the average blue ash tree has this marked characteristic; of course, this is due to the fact that the older branchlets have become round. The blue ash is a large Western species which grows from 60 to 70 feet, and sometimes 100 or even 120 feet high.



Blue Ash, with seed twisted one quarter of the way around.

* East of the Mississippi River the red and green ashes grow side by side, and retain their individual character; but in the West they are connected by intermediate forms which can be referred to one as well as the other.—*Silva of North America, C. S. Sargent.*

The bark of the trunk is light gray, and it cracks in thin scales.

The leaves (eight to twelve inches long) are composed of from five to nine (usually seven) yellow-green leaflets, which are slightly paler below, and tipped along the rib with downy hairs; the edges are sharply toothed, and the leaflet stem is barely an eighth of an inch long. In autumn the foliage turns a pale, dull yellow. The seeds are rather blunt and somewhat notched at the end of the wing.

The blue ash is not a very common tree, and it is found mostly in moist woods or on rich limestone hills in the West, from southern Michigan to central Minnesota; southward it extends to northern Alabama and northeastern Arkansas. The wood is hard and close-grained. In color it is brownish yellow, and it is used extensively for the interior finish of houses. A blue dye is extracted from the inner bark by steeping it in water, and to this fact it undoubtedly owes its name.

Water Ash.
Fraxinus platycarpa.
Fraxinus Caroliniana.

The water ash is a tree from 25 to 40 feet high, which inhabits the almost inaccessible river swamps of the South, where it is found in the shade of the bald cypress. Its leaves (seven to twelve inches long) have from five to seven ovate leaflets, which are deep green above and pale green below, with per-

haps a slight downiness along the ribs. This tree may be easily distinguished from the other ashes by its broad, roundish, slightly toothed leaflets, and the elliptical (not wedge-shaped) seeds.

Carolina Water Ash.

The water ash extends from southern Virginia to central Florida; westward it reaches its limit in the valley of the Sabine River, Tex., and in south-eastern Arkansas.

Black Ash.
Fraxinus sambucifolia.
Fraxinus nigra.

The black ash is a tall, slender tree which grows from 40 to 70 feet, and occasionally, in the forest, 90 feet high; it has a dark-gray trunk. Its leaves (twelve to sixteen inches long) are composed of from seven to eleven leaflets, which are joined to the main stem without a sign of a stemlet; they are distinctly but irregularly toothed, and the stem is grooved; in color they are a deeper green than those of the white ash, and pale below, with rusty hairs scattered over the whitish ribs. In the White Mountain region they do not appear until the latter part of May, and they turn brownish and drop after the first heavy frost in early October. In fact, I have noticed that the black ash sheds its leaves almost if not quite as soon as the butternut. The winged seed is blunt at

Black Ash.

both ends, and the wing forms a margin *all around* the seed.

The black ash is found in swamps and moist wood-

lands, and is distributed from Maine to northern Minnesota; southward it extends to the mountains of Virginia, and southwestward to central Missouri and northwestern Arkansas. The light, brownish wood is soft and has a handsome grain. It is used for the interior finish of houses, and for cabinet-work and barrel hoops. The pliable and tough wood of young saplings I have found very useful for ribs in the construction of a river canoe. Soaked in hot water, it is quite surprising to see how much bending and twisting a strip of young black ash will bear before it breaks.

The European ash (*Fraxinus excelsior*), which is sometimes found in parks and gardens, has from eleven to thirteen leaflets (a lesser number in some varieties), which are deep green, broad, lance-shaped, and toothed. The seed, like that of the black ash, is also winged all around. The weeping ash (var. *pendula*) is one of the most beautiful forms of this species.

CHAPTER XX.

IV. Compound Opposite Leaves.

2. With teeth. Leaflets radiating.

THE HORSE-CHESTNUTS OR BUCKEYES.

The beautiful native buckeyes and the foreign horse-chestnuts, with broad, rounded figures and hand-shaped, radiating leaves, are conventional characters which concede little in the direction of the picturesque. Even the symmetrical sugar maple is not without a certain freedom in detail as well as outline; but the horse-chestnuts are the embodiment of rule and order, both in figure and foliage. A full-leaved branch is so conventional in its leaf arrangement that a careful drawing appears like a decorative design—I mean if the branch is copied, looking at it square in the face. The most beautiful of these radiating-leaved trees is the common horse-chestnut,* which comes from Europe. It is a medium-sized, round-

Horse-Chestnut.
Æsculus Hippocastanum.

* "It was introduced into this country about the middle of

figured tree, on the average not more than 40 feet high. The leaf * is composed of about seven leaflets (sometimes there are but five), which are abruptly pointed, strongly veined, and toothed on a somewhat scalloped edge. The large, pyramidal clusters of cream-white flowers, spotted with dull yellow and ruddy purple, bloom in May or June, and impart a very ornamental appearance to the tree. The fruit has a thickish husk with strong prickles and a large chestnut-colored nut, of a peculiar, strong, but aromatic odor. It is not edible; some say that it is poisonous.

The red horse-chestnut (*Æsculus rubicunda*) is thought to be a hybrid between the common horse-chestnut and *Æsculus pavia*, one of the buckeyes. It is a great favorite, and is frequently found in parks and gardens. Its flowers are of a warm, pinkish-red color, and its leaf is composed of from five to seven rather rough leaflets, sometimes dotted here and there with red. The combined pink and green colors of this tree when it is in bloom are most charming and soft. The tone is pitched in a low key, and merits

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the last century; the first tree is said to be still standing on the estate of Mr. Lemuel Wells, of Yonkers, N. Y." Prof. Sargent, in Silva of North America, says it is indigenous in the mountains of northern Greece.

* The leaves are rarely or never eaten by the larvæ of insects.

Horse-Chestnut.

the attention of those who delight in "æsthetic" color.

Ohio or Fetid Buckeye.
Æsculus glabra.

The Ohio or fetid buckeye is a small tree from 20 to 35 (rarely it is 70) feet high, whose gray bark has a disagreeable, rank odor. Its leaf is composed of five, sometimes seven, long, ovate leaflets, which are *not* broad and abruptly pointed like those of the horse-chestnut. Their edges are rather unequally fine-toothed. The flowers are small, not showy, and light yellow green. The fruit, which is about an inch and a quarter or two inches in diameter, has prickles on the husk (which incloses two nuts) when it is young; otherwise it has a warty appearance. The nut is smooth, and an inch or more broad.

Ohio Buckeye; one leaflet, flowers and nut.

The Ohio buckeye * grows on river banks and low ground from western Pennsylvania to southern Iowa, central Kansas, and Indian Territory; southward it extends west of

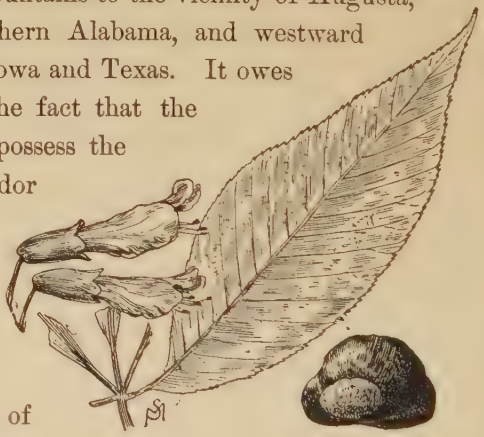
* The extensive growth of this species in Ohio, the "Buckeye State," occasioned that name.

the Alleghany Mountains to northern Alabama. The wood is light and tough.

Yellow or Sweet Buckeye.

Æsculus octandra.
Æsculus octandra.

The yellow or sweet buckeye is a large tree from 30 to 90 feet high (southwestward it is only a shrub 6 feet high), which grows in rich woods from Allegheny County, Pa., southward along the Alleghany Mountains to the vicinity of Augusta, Ga., and northern Alabama, and westward to southern Iowa and Texas. It owes its name to the fact that the tree does not possess the disagreeable odor common to other members of the family.



Sweet Buckeye; one leaflet, flowers and nut.

The leaves are composed of from five to seven elliptical leaflets from four to six inches long. They are sharply and rather evenly toothed, and often a trifle downy along the ribs beneath. They are sometimes shed quite early in September. The flowers are dull yellow.*

* I have drawn the flower because it is distinctly different from that of the Ohio buckeye; the calyx is elongated and

The fruit, about two inches or more in diameter, has an uneven but *not* a prickly surface. The nut, one or two in a husk, is about an inch or more broad. The wood is light and strong, and is sometimes used for making kitchen utensils.

The purple sweet buckeye, *Æsculus octandra*, var. *hybrida* (also called *Æsculus flava*, var. *purpurascens*) has ruddy-colored or dull-purplish flowers, and leaflets which are *very downy* beneath. Its bark is lighter colored.

The red buckeye (*Æsculus Pavia*) is little more than a shrub, but it occasionally grows to a height of 25 feet.* It has large clusters of bright-red flowers (which bloom in May), and generally smooth leaves. This tree grows wild in the fertile valleys of Virginia and southward. It extends westward to Missouri.†

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the lateral petals are long, narrow, and roundish at the ends.

* The largest tree of this species in this country is in the garden of Mr. Landreth, of Philadelphia; it is 25 feet high, and has a trunk circumference of three feet and three quarters.—*Trees and Tree-Planting, J. S. Brisbin.*

† In the Carolinas its saponiferous roots are used as a substitute for soap, and its bruised branches and bark are used to stupefy fish in small ponds.—*Trees and Tree-Planting, J. S. Brisbin.*

CHAPTER XXI.

V. Evergreen Leaves.

1. With long needles.

THE PINE.

The evergreens are pre-eminently trees of winter. At no other season of the year is the greenness of foliage quite so restful and grateful to the eyes. But this demulcent effect on one's eyesight, at the time of dazzling snows, is nothing in comparison with the marvelous ameliorating influence which these winter trees exert on our rigorous Northern cold. They rob the winter winds of their severity, and produce for the invalid an equable and temperate climate possessing remarkable health-giving qualities. There is no exaggeration of truth in saying that the temperature in a pine belt differs radically from that in the open country fifteen miles away, although it would be difficult to demonstrate the fact by means of the thermometer. The mercury might record but a slight variation in the temperature of the two places, but

one's feelings would be sure to indicate an immeasurable change.

The fact remains, however, that the winter climate of the "pines" in New Jersey is very similar to that of Florida. One is not so much surprised at this after a walk through the pine forest, for all below is mild and quiet, while above, the sighing, singing winds relentlessly toss the rugged branches to and fro. In the White Mountains I have also noticed that, however bitterly cold it was on the open road, the sheltered depths of the forest permitted me to use my pencil with unprotected fingers for quite a length of time. One must experience the tonic of the winter air laden with balsamic odors in order to properly appreciate it. There is as much scientific truth as there is poetry in what Whittier had written long before the Northern winter sanitarium became popular:

> There's iron in our Northern winds;
> Our pines are trees of healing.

But there are few of us who see much of the pines in winter, and in summer their beauty is eclipsed by the prodigal luxuriance of the deciduous trees. However, the pine grove is not unappreciated even in August, and if we will bend our steps thither we will enter a region far more accessible and inter-

esting than the overcrowded one where grow the oak and maple.

White Pine. *Pinus Strobus.*

The fine-needled white pine is the most valuable timber tree of our country. It grows with a straight trunk from

White Pine, leaf at A.

70 to 180 feet high, and has yellowish-white, soft wood with a straight grain nearly free from resin.

But, alas for the white pine! it has been so extensively used for building purposes, and many regions that were supposed to contain inexhaustible supplies have been so completely stripped of all valuable timber, that the day is approaching when the pine forest will be no more. The beautiful grove known as the Cathedral Woods, in North Conway, N. H., is rapidly falling a victim to the axe. The life of a tree is considered of less value than its timber; and our State Legislatures seem unable to exert their power of eminent domain in behalf of the tree, although no end of it has been expended in obtaining highways for the locomotive.

White Pine Cone.

The white pine has the softest and most delicate needle of all the species. It grows in a little bunch of five, and varies in length from three to four inches. Its color is a clear, lightish green, with a trifle of whitish bloom. The cone, from four to six inches long, is narrow and slightly curved; it has no prickle at the tip of the rather thin scales.

This pine is common from Maine westward to Minnesota and eastern Iowa; southward it extends along the Alleghany Mountains to Georgia. On

older specimens the gray-brown trunk is rough, but on the younger ones it is quite smooth.

Southern Yellow Pine.
Pinus palustris.

The Southern yellow pine has very resinous yellow wood, and extremely flexible needles from ten to fifteen inches in length, bright olive-green, and grouped in bunches of three; they grow in thick clusters at the ends of the branches. The beautiful cylindrical cones are from six to ten inches long, light brown, and have rather thick scales with tiny prickles at the tips. The needles and cones are very ornamental, and they can be used most effectively in decoration. Indeed, for this purpose I like the branches of a Southern yellow pine better than I do palm leaves.

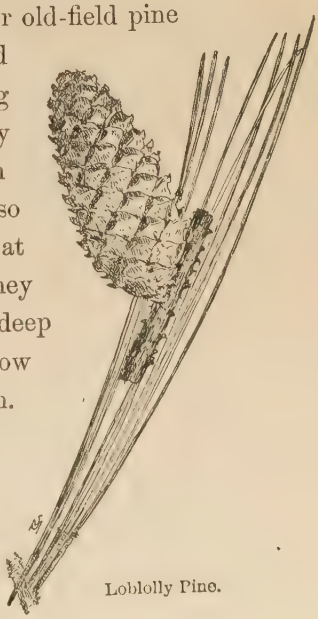
Southern Yellow Pine (Georgia Pine). One scale of cone at A.

This pine furnishes the most valuable and ornamental wood of all the ever-

green trees; it is generally called Georgia pine, and its color is a rich, transparent ruddy, gold-ocher; it is also extremely hard and durable, and is largely used for the decks of ships. The tree grows about 70 or 80 feet high, has rather thin-scaled bark, and is found in sandy soil from southern Virginia to Florida and Texas.

Loblolly or Old-field Pine. *Pinus Tæda.*

The loblolly or old-field pine is a large-sized tree, growing from 50 to 150 feet high (only in the forests does it attain the greater height), which also has long needles, measuring at most perhaps ten inches; they are rather rigid in character, deep olive-green, slender, and grow three (rarely two) in a bunch. The cones are not pendant, but are placed laterally on the branchlets. They are three or four inches long, conical, and the scales have short, straight, or sometimes slightly incurved prickles.



Loblolly Pine.

The loblolly pine is found from Delaware to Florida, near the coast, and thence it extends to

Texas and Arkansas. Its wood has no especial value.

Northern Pitch Pine.
Pinus rigida.

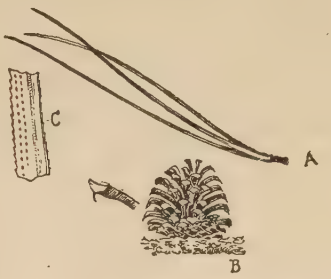
The Northern pitch pine is a medium-sized, rugged-looking tree which grows from 30 to 80 feet high, with curved needles about three or four inches long, grow-

Northern Pitch Pine.

ing in bunches of three; they are coarse, rigid, and somewhat flattened. The cones are from one and a half to three and a half inches long, ovate, and the scales are furnished with a short recurved prickle. Sometimes the cones grow in clusters.

The tree has a very rough appearance, with

scragged branches and coarse-scaled, dark, brown-gray bark. Its wood is hard, pitchy, and of no value except for fuel. My drawing of the magnified needle will show something of the rough character which marks every detail of the tree. The edge of the needle is toothed like a saw, but the surface is daintily marked by rows of fine white dots. Sometimes Nature's roughness under the microscope resolves itself into extreme delicacy.



Northern Pitch Pine. Needles at A, cone and prickled scale at B, magnified needle at C.

The Northern pitch pine grows from Maine to northern Georgia, western New York, and eastern Kentucky. It is common in sandy barrens, and is sometimes found in swamps.

Scotch Pine. *Pinus sylvestris.* The Scotch pine, also called (but wrongly) Scotch fir, is the common pine of northern Europe. It has been introduced into this country so extensively that few parks or private grounds are without at least one specimen. The color of this pine is a study for an artist. In many specimens it is a most beautiful light sage-green, and in others it is bluish sage-green. Considering the interest attached to tree colors, and the con-

clusions I have arrived at regarding them, it is somewhat disturbing to find, in the half dozen botanical books before me, the leaf color given, but no further hint of the general color effect of the trees.* So, when I say that the foliage of the Scotch pine is "sage-green," I find myself without support from the botanists. However, botanical writers rarely assist us in the recognition of those broad effects of color and form in Nature which are sometimes profoundly impressive,† and their indifference to truths, which are not categorically botanical is therefore excusable; but for me it would be inexcusably negligent not to say that the Scotch fir possesses a most pe-

Scotch Pine.

* The color of the leaf by no means decides the color of the tree. The latter is generally complex, through a variety of causes chief among which is atmospheric influence.

† I must not omit to say, however, that Prof. Sargent, in his Silva of North America, has given most graphic and truthful

culiarly æsthetic light green entirely unlike the color of any other pine tree.

The grayish, blue-green needle is from two to two and a half inches long, curved, twisted, and grows in pairs. The very odd-looking cones are from two to three inches long, tapering, angular-scaled, and they require two years in which to ripen; the scales are tipped with a recurved prickle. The trunk of the Scotch pine is a warm, ruddy buff color. The little twigs are yellowish, and the needles grow thickly at the ends of the branchlets. This tree furnishes the wood called deal, so commonly used in Europe.

Table Mountain Pine.
Pinus pungens.

The Table Mountain or prickly pine is an inhabitant of the Alleghany Mountains, and is found from Pennsylvania to South Carolina. Its stout needles are about two inches long, flat, and dark, bluish green; they grow in bunches of two and sometimes three. The cone is about three inches or

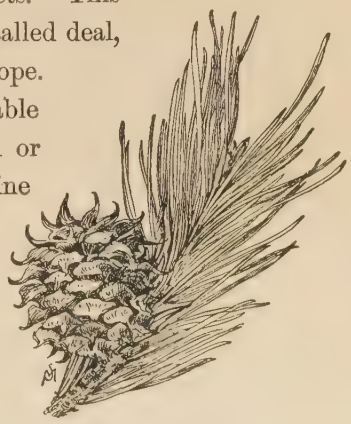


Table Mountain Pine.

descriptions of the autumnal coloring of many trees and their leaves.

more long, ovate, and its scales are armed with a *strong, hooked prickle* about a quarter of an inch long. The general appearance of the Table Mountain pine is similar, excepting its color, to that of the Scotch pine; but its height is only from 20 to 60 feet. The wood is not useful for timber.

Jersey Scrub Pine.
Pinus inops.
Pinus Virginiana.

One might think, from its low, straggling character, that the Jersey scrub pine was without beauty or interest. I am not of that opinion, however, for the bold foliage and long branches are uncommonly picturesque when seen in relief against the sky, and certainly no artist could wish for a wilderness more beautiful than that called the "Pines" in New Jersey, where the tree may be seen in its prime, clothed in a soft, warm green in striking relief with the marvelously white, sandy floor beneath. There is a certain rugged beauty to the tree, notwithstanding an unconventional appearance. Its long, outstretched limbs with irregular dotted outlines, its bristling warm green needles, and its strongly accented, blackish trunk—these are attractive qualities which not all the other pines possess even in part.

The needles, one and a half to barely three inches long, grow two in a bunch; they are flat, a trifle twisted and curved, one sixteenth of an inch wide, and of a lively, deep yellow green. The outer surfaces

are a little deeper in color. The bark of the trunk is grayish brown, and the thin scales, perpendicularly arranged, are often sharply and horizontally cracked across. The

Jersey Scrub Pine.

young twigs have a purplish-brown hue, with a plum-like bloom.

The Jersey scrub pine grows from 15 to 40 feet high, and is found on barren and sandy ground, from Long Island, N. Y., to South Carolina near the coast, and westward through Kentucky to southern Indiana. The cone is about two inches long, and is furnished with thornlike prickles on the tips of the scales.

Yellow Pine.
Pinus mitis.
Pinus echinata.

The yellow pine is a straight, symmetrical, often cone-shaped tree, 50 to 100 feet high, which is valuable for its lumber. Indeed, yellow pine is next in value to Georgia pine, and is largely used as an ornamental wood for interior trimmings, flooring, ceiling, ship-

building, etc. The grain of the wood is very beautiful, and shows long streaks of deep, gold-ocher color,

Yellow Pine.

rather more delicate and less ruddy than that of Georgia pine. The tree has a handsome figure, with regular branches, and soft, slender needles which grow thickly at the ends of the branchlets. It is one of the most ornamental members of the pine family.

The needles, two and a half to five inches long, grow two and occasionally three in a bunch; they are roundish, slender, and dark green. The trunk bark is gray brown, and the cones (the smallest ones of the American pines), barely two inches long, have rather small, weak prickles at the tips of the scales.

The yellow pine is common in dry or sandy soil from Staten Island, N. Y., southward to Florida, and southwestward from southern Indiana to southeastern Kansas and Texas.

Gray or Northern Scrub Pine.
Pinus Banksiana.

The gray pine, sometimes called Northern scrub pine, is the least interesting of the species. Its needle is so short that in general effect the tree reminds one of some scraggy coarse spruce. It is often a mere shrub, and very rarely attains a height of 30 feet.

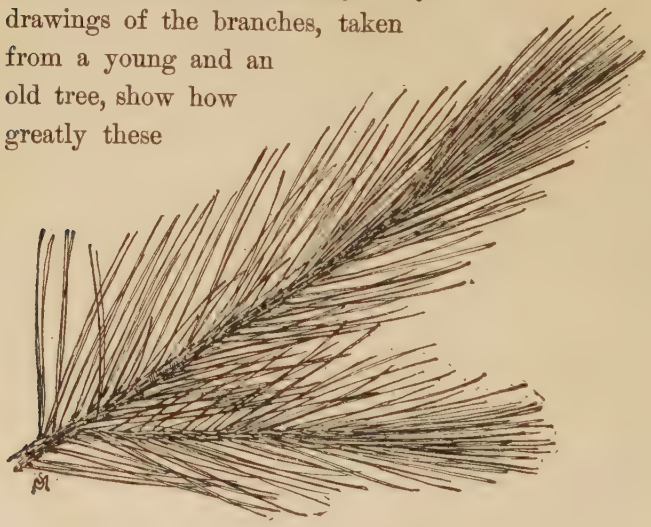
Gray or Northern Scrub Pine.

The needles are the shortest in the pine family; they are scarcely over an inch long, flat, and about a sixteenth of an inch wide. They usually grow in pairs, and have an even bright yellow-green color, which varies but a trifle in different specimens. Notice also that the two needles do not hold closely together, as in the case of the white pine, but diverge at a wide angle. The newer whitish buff cones, about two inches long (sometimes less), are often curved at the end, and point in the same direction as the branch. The old, dark-brown cones have reflex scales with no prickles. The young twigs are reddish. This pine is

found in the barren or sandy soils of southern Maine, northern Vermont, and westward to Minnesota. I have never found it in the sandy valleys of the White Mountain district.

Red or Norway Pine.
Pinus resinosa.

The red pine, which is usually called Norway pine in New Hampshire, is one of the handsomest members of its family, especially when *young*. My drawings of the branches, taken from a young and an old tree, show how greatly these

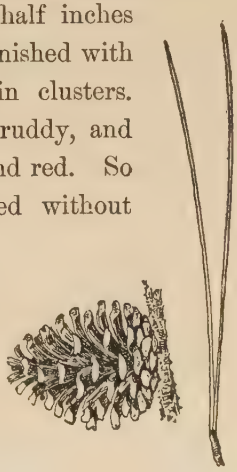


Young Red or Norway Pine.

differ. The needles of a young specimen are thickly clustered along the stout and extremely ornamental branch which is terminated by a still thicker cluster of long, dark-green needles. These branches

I have found very useful for decorative purposes. Their bold, vigorous outlines can scarcely be excelled by the palm leaf.

The needles, five to seven inches long, grow in pairs. They are roundish, straight, and dark green. The cones are two or two and a half inches long, and their scales are *not* furnished with prickles. They usually grow in clusters. The bark of the trunk is very ruddy, and even the branchlets are smooth and red. So the tree may easily be identified without the aid of the needles.



Norway Pine cone and needle.

The Norway pine grows to a height of from 50 to 90 feet; it is very common, particularly on the worn-out pasture lands, in the southern districts of the White Mountains, and it is found from Massachusetts westward to Minnesota. The wood is hard, durable, not very resinous, and is well adapted to construction requiring unusual strength. It makes a fine flooring, although it has not the beautiful grain of the yellow pine. As an ornamental tree the young red pine has few equals; but I must not say too much about this, lest, by provoking comparisons, some injustice will be done another equally beautiful pine.

We must not forget that the beauty of Nature confines itself to no rule of limitation; even as "one star differeth from another star in glory," so beauty is made perfect by differences in type—and in Nature

Old Norway Pine.

these are manifold. The pity of it is that so few of us are willing to believe in more than one or two *types*. I will not say, then, that *Pinus resinosa* is more ornamental than *Pinus Strobus*, but that the beauty of the former can never be appreciated until the beauty of the latter emphasizes it by contrast.

CHAPTER XXII.

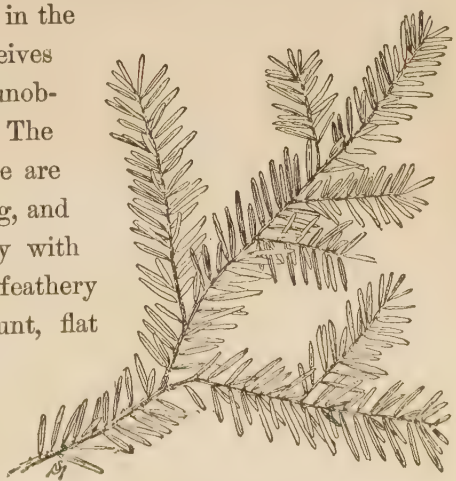
V. Evergreen Leaves.

2. With short, flat, blunt needles, or with soft needles.

THE HEMLOCK, FIR, AND LARCH.

Hemlock.
Tsuga Canadensis.

THERE is no more graceful and ornamental evergreen tree than the hemlock when it grows in the open, where it receives the full benefit of unobstructed sunlight. The boughs of this tree are plumelike, drooping, and spread out laterally with an appearance of feathery lightness. Its blunt, flat needles, about half an inch long, are the most lustrous dark green imaginable, with a delicate whitish tint beneath; in late



Hemlock.

spring the newer ones are light *yellow* green. There is no phase of tree life more beautiful than that presented by the hemlock clothed in its springtime garb; the tips of the dark-green sprays are painted in yellow-green, with a fairylike daintiness, the effect of which could only be conveyed to the mind by a careful study in color.

Hemlock Cones.

But a young, full-foliaged hemlock on the edge of the pasture is a very different character from the dark and gloomy tree in the forest shades; here, its straight stem, with few or no lower branches, rises to a height of from 50 to 80 feet.

The tiny cones are oval, thin-scaled, and, when young, tan-color. They are scarcely over half an inch long, and depend from the lower side of the branchlet; the tiny winged seed will be seen enlarged in my drawing at A. This tree abounds in the rocky woods of the North; it extends from Maine to Delaware, and follows the Alleghany Mountains southward to Alabama; westward it finds its limit in Minnesota.

The bark of the hemlock is largely used for tanning leather, and I am sorry to say that in the White

Mountains many of the trees are destroyed solely for their bark, although the timber is very valuable for house-framing and for rough boarding; much of it, though, is subject to a flaw called "wind shake," a perpendicular splitting of the wood caused by winter storms which bend and "shake" the stems. The wood is rather white, and faintly tinged with buff or pink; its grain is coarse, twisted, and unfit for interior finish.

The mountain hemlock (*Tsuga Caroliniana*) is a species so similar to the foregoing that it is not an easy matter to discriminate between them. It is rather rare, anyway, growing wild only in the higher Alleghany Mountains. A small specimen in the Arnold Arboretum, the only one I have seen, differs from the common hemlock in its larger needle more thickly distributed over the branchlet, and its larger cone with more spreading scales. This tree rarely grows over 30 feet high.

Balsam Fir.
Abies balsamea.

The balsam fir is the much-esteemed "Christmas tree," whose aromatic perfume is a sufficient means for its identification. This is the tree, in fact, which furnishes the needles for "pine pillows." It can not be reasonably confused with the spruce for several reasons. Its needle is about three quarters of an inch long (rarely it measures a full inch), dark blue-green above and

silvery blue-white below; it is very flat, straight, not curved, and has a *very blunt end.* There is a

Balsam Fir.

groove in the center of the needle above, and a corresponding raised rib below. The branchlets are flat, and the needles do not project from them in all directions as they do on the spruce; the little branchlets are also conventionally arranged at an angle of 45° with the larger ones.

The bark of the fir is gray, and what little marking there is on the trunk is horizontal or has a blister-like appearance; it is from these tiny excrescences that the well-known Canada balsam is obtained, which is remarkable for its healing properties.*

The cone of the fir is from two to four inches long, one inch broad, and has a peculiar purplish color when young; it holds a somewhat *erect* position on the edge of the branchlet, and the scales are deciduous, flat, rounded, thin, and accompanied by a leaflet (bract) which is tipped by an abrupt slender point.

Balsam Fir Cone.

The balsam fir is found in damp woods and mountain swamps from Maine to Minnesota, and

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* The atmosphere which is laden with the odors of the balsam fir is also remarkable for certain qualities which are beneficial to invalids. Asheville, N. C., is situated on a high plateau surrounded by the Balsam Range of the Alleghany Mountains. In this town the pure, dry air sifted through the balsam firs has a wonderful power of healing for many lung diseases. There is a sanitarium there which is a popular and famous resort for consumptives.

The late Dr. A. L. Loomis, of New York, in a paper read some years ago before the State Medical Society, testified to the fact that the pines and firs which abounded in the Adirondack region ladened the atmosphere heavily with ozone, and that the resinous odors of the evergreens were the most beneficial of all tonics for the patient suffering with pulmonary phthisis.

southward from Pennsylvania along the Alleghany Mountains to North Carolina. I call to mind a most beautiful group of these spirelike trees which flanks what is known as the "Bog Road" in Campton, N. H. I can conceive of nothing more solemn and impressive than the fir tree in moonlight; although it never attains an altitude of more than 45 feet (so far as my knowledge extends), it certainly reveals, in the light of the moon, a figure of vague and stately proportions. My sketch was taken from a specimen 42 feet high, which grows in a maple orchard at Blair, N. H.

Fraser's Fir.

Fraser's Balsam Fir. *Abies Fraseri.*

Fraser's balsam fir is a rare, small tree which does not exceed 40 feet in height, and which grows in the higher Alleghany Mountains from North Carolina southward. The very blunt needle is from one half to three quarters of an inch long, and bluish white on the back, with a distinct line of green down the middle; the little branchlets are thickly beset with needles on the upper side, and on the lower side the color is extremely whitish. While the

BALSAM FIR.

Bog Road, Campton, Grafton Co., N. H.

foreshortened branchlets of the common fir generally appear flattened, Fraser's fir shows a considerable thickness of needles on the upper side; and, on the contrary, the spruces show the greater thickness on the under side. My little diagrams will make my meaning plain.

A, Spruce; B, Fraser's Balsam Fir; C, Balsam Fir.

The cone is oblong, and from one to two inches long, the leaflets (bracts) having a short-pointed upper termination conspicuously projecting and reflexed. The general color of a young Fraser's fir is deep *olive*-green with dashes of bluish sage-white.

Larch or Hackmatack.
Larix Americana.
Larix laricina.

The larch, sometimes called hackmatack or tamarack, is a tall tree 50 to 100 feet high, with extremely thin, delicate pale-green foliage. The leaves are *deciduous*, soft, and they grow in bunches along the branchlets like thick threads about an inch or less long. The cone is from one half to three quarters of an inch long, reddish brown, and has very few scales.

The dainty, cool green coloring of the larch in spring, and its extraordinary thin, tall figure, which is delicately penciled against the blue sky on a clear day, make it an exceedingly ornamental tree. The larch

inhabits cold swamps and shady hillsides throughout the North; its southern limits are Pennsylvania, northern Indiana and Illinois, and central Minnesota.

The European larch (*Larix Europæa*) is a fast-growing tree considered even more ornamental than its American relative, with leaves about an inch long (a trifle longer on the average than those of the other species), and of a deeper light green. The branchlets of this tree are somewhat pendulous. The cones are sometimes more than an inch long, and they have numerous scales. There is also a weeping form of the European larch.

American Larch.

CHAPTER XXIII.

V. Evergreen Leaves.

3. With short, sharp needles, or with scales.

THE SPRUCE, ETC.

The distinguishing difference between the fir and the spruce needle is the sharp tip of the latter, and the blunt, almost squarish tip of the former. A comparison of my drawings of branchlets taken from these two trees will also show a great difference in details which I need not mention here. The little twigs of the spruce are always surrounded by a body guard of needles; the fir tree is content to guard the upper side of the stem, and allow the under side to meet the winter winds unprotected; hence both stem and back of leaf contribute a pleasing variety of color to the tree.

But the spruce (at least the Eastern spruce) has a uniform dark, somber green,* which only varies with

* The slight bloom which is occasionally present on the under side of the needle does not seem to affect the general green of the tree.

the species. There are three species common in the northeastern section of the country—the red, black, and white. The most interesting one of these is the red spruce.* This tree is familiar to those who may have climbed the granite hills of New Hampshire; nowhere else has the spruce seemed to me quite so impressive, for in

Red Spruce.
Picea rubra.
Picea rubens.

Red Spruce.

* Botanists differ in opinion about the red spruce; some consider it a variety of the black spruce. In the Manual, Gray follows Englemann's name, *Picea nigra*, var. *rubra*.

RED SPRUCE.

Slope of Mt. Washington, Coos Co., N. H.

this section of the country it holds almost exclusive possession of the wildernesses and the great summits which rise from 4,000 to 4,500 feet above sea level. In traveling through the valleys of the Gale, Ammonoosuc, Pemigewasset, Ellis, and Saco Rivers, one may trace on the mountain walls the line where the maples and birches stop and the dark spruces begin; their somber black-green color clothes the greater hills with something like majestic solemnity —an aspect which the poet Whittier must have had in mind (although he does not allude to the spruce tree) when he wrote this:

> By maple orchards, belts of pine,
> And larches climbing darkly
> The mountain slopes, and, over all,
> The great peaks rising starkly.

These lines, however, perfectly express the impression which the spruce-clad mountain wall produces on the mind of one who passes through the valleys of the White Mountains.

In the Sandwich country, the scene of Whittier's Among the Hills, the somber coloring covers the northern hills from Sandwich Dome to Mount Chocorua, a distance of fifteen miles.

The red spruce in mountain fastnesses is the most picturesque tree imaginable; it rivals the cypress of the Southern swamps. In the dense forests which

flank the Presidential Range it rises far above its neighbors from a bed of damp moss and pale-tinted ferns, with tall, sheer trunk, and scragged limbs draped with hoary moss, the acknowledged king of the wilderness. It bears all the marks of a hard fight for life amid opposing elements, but winter's storms and biting arctic winds avail nothing, for, in spite of them, the tree climbs to the very borders of the Alpine region.

As Gray hardly does more than mention the red spruce in the Manual, and in the Field, Forest, and Garden Botany he does not allude to it at all, it will be best for me to point out those differences which have been explained to me by several botanists, and add the results of my own observations.

The general appearance of the red species in the White Mountains, and the black species in the Arnold Arboretum, do not correspond at all; the trees are entirely different in color. The red spruce is a dark, yellow-olive green; the black spruce is inclined to a purplish black olive or an intense olive-green. Of course, the color of the red species resolves itself to an intensely dark, black green, as it is seen among the deciduous trees in summertime on the flanks of the great mountains; it is not possible, therefore, to judge of a tree color when it is a mile or so away; but as seen together, the two species a

hundred feet from the observer have no resemblance to each other in point of color. I might describe the black spruce as having a blacker tone with a misty effect.

The cone of the red spruce is comparatively redder than that of the black spruce, and it is usually a trifle larger; as a rule, the edges of the scales are not so jagged as those of the black spruce cone, and if my drawings are compared it will be seen that the last-mentioned cone has a decidedly square-pointed scale.* Gray describes the black spruce cone as having a *thin denticulate edge*. This is a marvelously good point of distinction, for, if one will snap the edge of a red spruce cone scale with the finger nail, it will respond with a somewhat musical note; on the contrary, a black spruce specimen is either so thin that it will not snap at all, or else it will produce a note pitched so high that there is hardly any music left in it. The same experiment with the papery cone of the white spruce elicits a very low note with hardly any musical quality. Of course, only old or very well dried cones will serve for this test.

Another point of distinction between the red and black spruces is observable in the tiny bare twigs: in the red these are tan-red, in the black they are con-

* This is not invariably the rule; sometimes the scales are rounder, but still jagged-edged.

siderably browner and duller—in a word, they lack color. It is easier to make this test after the branchlets have been kept long enough for the needles to drop off. By comparing the three species it will then be seen that the tiny twigs of the white spruce are very light and perfectly smooth, while the black and red spruce twigs are covered with tiny hairs (see my drawings marked A, of magnified black and white spruce twigs), and are much darker in color.

The bark of the trunk is brown and scaly, not smooth and gray like that of the fir. In March, spruce gum is gathered from the seams in the trunk.

The red spruce is distributed over the country from Maine to Pennsylvania and Minnesota; it extends southward along the Alleghany Mountains to Georgia. There are immense tracts of it in the mountain regions of New Hampshire and Maine, and I know of one forest region comprising no less than one hundred square miles which is almost exclusively occupied by red spruce of the largest proportions. This land lies in the heart of the White Mountains, with Mounts Guyot and Bond on the north, Willey, Nancy, and Tremont on the east, Kankamagus, Osceola, Tecumseh, and Scar Ridge on the south, and the Lafayette range on the west. But already the woodsman's axe has penetrated deeply

into the forest, and a work of destruction has begun which before many years will occasion everlasting regret among those whose interests are closely connected with this part of the country.

Black Spruce.
Picea nigra.
Picea Mariana.

The young black spruce is often whitish purple-green or uniform deep olive-green (not bluish), with no effect of bloom. The needle is sharp, four-sided, slenderer than that of the red spruce, straight or curved, as

Black Spruce.

the case may be, and often grows close to the tan-colored stem; the older stems, half an inch or so in diameter, are light brown gray. The cone, about an inch and a quarter long, is a beautiful light tan color when young, although in the beginning it is madder purple. The old cone is apt to cling tenaciously to the branchlet, and assumes a dull gray-brown hue;

the scales are very thin at the tip, somewhat square-pointed, and often *eroded at the edge.* The lower branches of tall trees which grow in the open droop very gracefully.

The black spruce is found in cold and damp woods from New England to Pennsylvania, central Michigan, and Minnesota; southward it follows the Alleghany Mountains to North Carolina. The wood is yellowish white, tough, and clear of all but small and rather ornamental-looking knots; it is largely used in construction and interior finish.

White Spruce.
Picea alba.

White Spruce.

The white spruce differs from the black in the following particulars: The needle is slenderer and is sometimes longer, the little twigs are lighter colored (decidedly buff), and the cone is slender, longer, light green when very young, and light tan color when older. The cones of this spruce are often two inches long, and papery-soft under pressure of the fingers; they drop off at the end of the year. My drawing shows the cone in three stages of its development: notice that the edges of the scales are clean cut, not jagged. The needles are usually a trifle curved, and on being bruised emit a rather disagreeable, pun-

gent odor,* *which is a sufficient and certain means* for the identification of the tree.

The general color of the white spruce is light olive-green (that is, in young trees) with a suggestion of surface bloom. The tree is exceedingly ornamental, and assumes a perfect cone shape when its growth is unimpeded. It attains a height of from 20 to 100 feet, and is common in the extreme Northern States from Maine to Minnesota. The wood is beautifully clear and white, and is extensively used for interior finish. The best and clearest quality of white spruce I can only compare with satinwood.

White Spruce Cones.

Colorado Blue Spruce. *Picea pungens.* The Colorado spruce, sometimes called silver spruce, is a Rocky Mountain species frequently cultivated in our Eastern parks and gardens; there are several beautiful but small specimens in the Arnold Arboretum near Boston. There is also a charming larger specimen

* It is unpleasantly suggestive of the feline tribe.

on the lawn of Messrs. Ellwanger and Barry's nurseries at Rochester, N. Y. This tree may be identified at once by its long, sharp needle, which is generally sage-green in color, but which imparts to the tree a peculiar, light *bluish* tint. Not all specimens are alike in this respect, as some are greener than others, and a few have a somewhat rusty tinge.

Colorado Blue Spruce.

The needle is three quarters of an inch or an inch in length, curved, extremely sharp pointed, and it emits a disagreeable, pungent odor when bruised.* The little twigs bristle all around with needles, and when young they are a beautiful tan-color. The general effect of some of the handsomest Colorado spruces is light sage-green of a very bluish tone; the tree is one of the lightest colored of the ever greens, and has a perfectly conical figure which is strikingly ornamental, especially when it is crowned by clusters of long, red, tan-colored cones; these are usually four inches or less in length.

* The Colorado blue spruce has the same strong odor as the white spruce.

Norway Spruce. *Picea excelsa.*

The Norway spruce is another handsome species, which is generally confined to parks and private grounds. This tree grows from 50 to 120 feet high, according to circumstances; in the forests of Norway its long, drooping branches and tall figure form a conspicuous feature of the landscape. A number of varieties assume extraordinary if not grotesque shapes; a certain weeping form, which may be seen in the Arnold Arboretum, is a most peculiar, bare-branched, snaky-looking character, which can not fail to attract notice.

Norway Spruce.

The needle of the Norway spruce is slightly curved, about seven eighths of an inch long, and olive-green. The cone is four and a half or five inches long, and is pendant; its color is light reddish brown, and the rigid scales are square-pointed.

Bald or Southern Cypress. *Taxodium distichum.*

The bald cypress is a funereal-looking tree of the Southern swamps, whose picturesque, spirelike contour and grim stateliness are qualities not without a certain charm. It is found in swampy lands from Mary-

land westward to Missouri and throughout the South.* The tree is often completely surrounded by water, from which it rises straight as an arrow. In the water and growing up from the roots are frequently seen strange, lumpy, conical growths which are called "knees"; in a cypress swamp these conspicuous formations invariably attract attention.†

Bald Cypress.

The leaves of the cypress are *deciduous*, flat, light olive-green, and from seven sixteenths to three quarters of an inch long; they are sometimes (on the smaller and flowering branchlets) awl-shaped and overlapping. The general color of the tree is a dull, deep green. The roundish cones are an inch or so long, with closed, thickish, irregular scales.

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* At Chapultepec, Mexico, there is an American cypress which, when the Spaniards entered the country in 1520, was called "The Cypress of Montezuma," being then of immense size, over forty feet in girth and 120 feet in height.

† At every "knee" a downward, strong root deeply penetrates the ground; these "knee" roots are the anchors by which the bald cypress is held firmly in its soft and boggy bed.

There is a fine specimen of the bald cypress, 40 feet high, and with a symmetrical figure, at Dosoris, Long Island.

The bald cypress grows from 60 to 125 feet high, and furnishes valuable, clear lumber for interior trimmings. Its grain is exceedingly beautiful, and in the vicinity of the roots its darker rich brown color and striking convolutions are not equaled by many of the handsomest hard woods. For paneling and doors not the best of French walnut seems to me quite as effective as cypress.

Two trees which I must mention in passing, because they are representatively American, are the great trees of California—*Sequoia gigantea*, and the redwood, *Sequoia sempervirens*. The former is the largest tree known.*

Some of these great trees measure 300 feet in height, and through the tunneled stem of one particular specimen a coach and four horses has been driven, with room enough and to spare. The needles

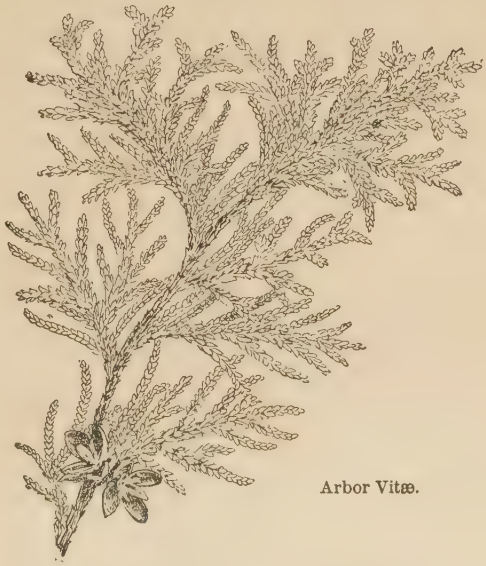
* Dr. Bigelow gives the following description of one, which I copy from General James S. Brisbin's Trees and Tree Planting: "Eighteen feet from the stump it was fourteen and a half feet in diameter. As the diminution of the annual growth from the heart or center to the outer circumference or sapwood appeared in regular succession, I placed my hand midway, measuring six inches, and carefully counting the rings on that space, which were one hundred and thirty, making the age of the tree, by this computation, one thousand eight hundred and eighty-five years. . . . It required thirty-one paces, three feet each, to measure its circumference, making ninety-three feet; and to fell it, it took five men twenty-two days, and the mere cutting down cost over five hundred dollars."

are awl-shaped, or flat and sharp pointed, and they are scattered around the branchlets; in color they are light olive-green. Occasionally the tree is planted in the East, but with little success, as it lives but a few years.* The other *Sequoia*, called redwood, is not so large, but the average diameter of the older trees is not far from eight feet. The needles are from half an inch to a full inch in length, smooth, sharp pointed, and deep, shiny olive-green above, but covered with a whitish bloom below. The cones are roundish and scarcely an inch in diameter. The ruddy-colored wood is not unlike that of the red cedar, and it is extensively used for interior finish. Unfortunately, it is rather soft. The redwood is not hardy in the Eastern States.

Arbor vitæ. *Thuja occidentalis.* The arbor vitæ is a familiar hedge evergreen, which needs no description for its identification. But we should know how to distinguish it from the common white cedar (*Chamæcyparis sphæroidea*). Arbor vitæ has a *bright-green* leaf spray with overlapping scales which are closely pressed together on the extremely flat branchlets; these have a very aromatic odor when bruised. The

* There is a remarkably beautiful, conical, but small specimen at Dosoris, Long Island, which still thrives. Prof. Meehan says that the *Sequoia* is destroyed by a parasitic fungus which was discovered by Mr. J. B. Ellis, of Newfield, N. J.

tiny cone, less than half an inch long, has from six to ten pointless scales, grows in an inverted position on the branchlet, is of a light yellow-brown color, and opens *to the very base* when ripe. The bark of the tree is fibrous, dull gray-brown, and on some speci-



Arbor Vitæ.

mens it grows in a somewhat spiral fashion about the trunk.

Arbor vitæ is found in swamps and cool, moist woods, from New York southward along the Alleghany Mountains to North Carolina; westward it extends to Minnesota. It grows from 20 to 50 feet

high, and has light, soft, but very durable wood especially adapted to withstand extremes of heat and moisture when in contact with the ground.

White Cedar.
Chamæcyparis sphæroidea.
Cupressus thyoides.

The white cedar is similar in some respects to the foregoing species, but certain differences are well marked, and they are sufficient to prevent a confusion of the two trees. The white cedar grows in a symmetrical conelike figure, with a general color effect of warm, light *brownish green*; arbor vitæ is usually *much* greener. The leaf spray of this tree is less broad and flat than that of the foregoing species; perhaps I might also call it less heavy and coarse. The tiny cone is scarcely one third of an inch in diameter, and has about six scales, which *do not open to the base* of the cone but at a wide angle with its axis; the scales are thick and pointed or bossed in the middle.

White Cedar.

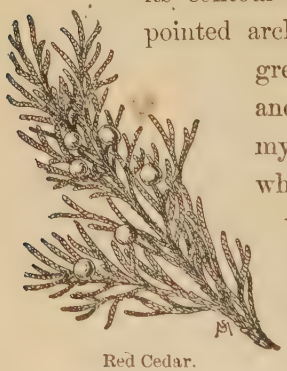
The white cedar is found from southern Maine through the Atlantic States to Florida, also along the Gulf to Mississippi, and generally inhabits cold swamps. It grows from 30 to 90 feet high; its durable though soft white wood is used in boat-

building, and for shingles, railroad ties, the foundations of buildings, and fence posts. It is capable of withstanding the disintegrating effect of alternating heat and moisture. The bark is very fibrous.

Common Juniper. *Juniperus communis.* The common juniper must be considered more as a shrub than a tree, as it rarely grows tall enough to look treelike. In habit, however, it is sometimes erect; but more frequently it has low-spreading branches, which grow so close to the ground that they are apt to be trodden upon. Its sharp-pointed needle, green below and a trifle whitish above, is very prickly, grows in threes around the slender stem, and does not often exceed half an inch in length. The pretty cadet-blue berries, about the size of a pea, are black purple beneath the bloom; they have an agreeable, aromatic odor when bruised, and are largely used in the flavoring of gin. Juniper is common throughout the North on dry and sterile ground, and grows hardly more than one or two feet high. I have found it plentiful on the eastern shores of Lake George, but never in the White Mountains.

Common Juniper.

Red Cedar. *Juniperus Virginiana.* Red cedar is a dark-hued tree of compact habit, popularly considered less beautiful than useful. It is certainly picturesque in some of its rugged and varied forms, but as it advances in age a certain raggedness of figure unfits it for the ornamentation of a neat and prim park, the orderly gardener of which prides himself on his success in excluding what I might call the wild and picturesque romanticism of Nature. But in Bucks County, Pa., I am told that many hillsides are ornamented with its Gothic figure (indeed, its contour is strikingly suggestive of the pointed arch), and that the landscape is greatly enriched by its somber and refreshing dull green. To my mind, there are few trees whose sober coloring is invested with so great a charm. I call to remembrance certain specimens growing in Virginia whose green is beautifully tinged with rusty red, and others elsewhere with a green pervaded by warm orange. In Roxbury, Mass., there are also many rusty colored trees. Not the least interesting effect of the coloring in the red cedar is the cadet blue-gray of the berries which plentifully besprinkle the branchlets



Red Cedar.

RED CEDAR.

Near Chatham, Morris Co., N. J.

of the fertile trees* in the autumn. The leaves are very tiny, and scalelike on the older branches, but awl-shaped or needlelike, sharp, and spreading on the newer ones; under close scrutiny the foreshortened little branchlet is square, and the color, where it is not rusty, is shiny olive-green. The berries, black-purple beneath the bloom, are about as large as small peas.† The bark is brown and fibrous, and sometimes comes off in long shreds, leaving the bare trunk smooth. The wood has an exceedingly spicy odor, and a wonderfully fine, straight grain which is peculiarly adapted to the needs of a lead pencil; its color is pale brownish-lake red. The red cedar is sparingly distributed, excepting in a few localities throughout the United States. It commonly grows to a height of 20 or 30 feet in the North, but southward it attains a height of from 50 to 90 feet. It is not to be found in the White Mountains.

A near relative of our red cedar, a tree which also possesses picturesque qualities, is the European yew

* The trees bearing staminate (unfertile) flowers, I am told, are the ones which are most generally tinged with a brown-red or tawny color.

† I am told that in Bucks County these berries furnish the birds with a plentiful amount of food in midwinter, and that on hot July days the oil is distilled in the hot sun so that the whole region about the trees is filled with the aromatic perfume. Many of the trees are of such dense growth that little or no sunlight penetrates to the ground beneath.

(*Taxus baccata*). This tree is planted in our country, but with indifferent success; it rarely amounts to anything north of Philadelphia. The evergreen leaves are sharp pointed, curved, flat, and they grow in ranks of two. In general effect the tree has dark-green, somber, but beautiful foliage. A remarkably symmetrical conelike variety of this species is called the Irish yew (*Taxus baccata*, var. *fastigiata*). There is a charmingly compact and beautifully formed tree of this variety at Dosoris, the home of Mr. Richard Starr Dana, on Long Island; but Mr. William Falconer says that the Irish yew does not thrive in this country—a pity, I think, because there are few trees which offer so great an inducement and promise to the gardener in search of a conventionally modeled tree.

The only yew native to this country is a mere shrub with straggling branches which spread widely over the ground; it is called *Taxus Canadensis* (*Taxus Minor*, Sarg.), and improperly ground hemlock. So superficial a resemblance to the true hemlock should not mislead one; the distinguishing characteristic of the ground hemlock a sharp observer would not fail to detect. Look at my drawing marked A; the needle at the end abruptly finishes in *a sharp point*. This is not the case with the needle of the true hemlock. I must also draw attention to

a charming quality of color in the ground hemlock needle which is rarely the possession of any leaf:

Yew.

the reverse side is precisely the softest, warmest, and most beautiful, rich yellow-green which we can find in Nature. I have already alluded to this particular green in a description of the mulberry leaf. If there are those of us who think the color nothing extraordinary, let them attempt the almost impossible task of matching it *exactly*. The beautiful translucent red berry of the ground hemlock, with the black spot in the center of the depression, is hardly less interesting than the warm, green foliage; its delicacy is only comparable to that of the pearly berry of the mistletoe.

The ground hemlock is common on shady hills and banks throughout the Northern States from

Maine to Minnesota; its southern limit is New Jersey. It is the last but not the least woodland character which I have thought sufficiently interesting and beautiful to include in my group of evergreen trees. Its lustrous, dark-green needle is as rich in color as that of the young and vigorous fir, and on the underneath concave surface is hidden that unique green which is its exclusive possession among the evergreens. What the ground hemlock lacks in stature it more than compensates for in color.

It will not do always to walk with head uplifted and eyes only for the tops of trees; if we do, something of beauty at our feet will be lost. Often the daintiest bit of tree life is heedlessly crushed by some ruthless foot. I was strongly impressed with this fact one time when, scrambling through the shrubbery on a hillside in an effort to reach a mountain ash, I trod upon some dainty waxen berries of the ground hemlock. The fruit of the mountain ash is heavy and coarse when compared with that of the ground hemlock. Place some of each together, and allow them to give their own testimony.

It is a blessed privilege to know the trees, the flowers, and the leaves by direct contact and close sympathy with them. It is not enough to behold a tree with our eyes and never touch it with our hands. Some of us are imperfectly aware of the personality

in a tree or flower, and we think Nature reveals herself to a select few. What a foolish error of judgment! It is ourselves who accomplish the revelation, *whatever that may be*; it is our own fault if we do not succeed. We do not admit Nature to an intimacy which it is the privilege of some cherished friend to enjoy, and we charge her with being unfathomably mysterious and enigmatical.

Thank God, one sweet-spirited man could testify to the contrary! Many of us who are city bred would be glad to possess at least some small portion of his understanding of her. I believe we may possess not only a share but a fullness of this understanding, if we will only spend less time in the drawing room and more in the woods; then, perhaps, in the presence of the everlasting, forest-clad hills, we can confidently say, with Whittier:

> Transfused through you, O mountain friends!
> With mine your solemn spirit blends,
> And life no more hath separate ends.
>
> I read each misty mountain sign,
> I know the voice of wave and pine,
> And I am yours, and ye are mine.
>
> Life's burdens fall, its discords cease,
> I lapse into the glad release
> Of Nature's own exceeding peace.

A SYSTEMATICAL INDEX

OF THE NAMES OF TREES OF THE EASTERN UNITED STATES, INCLUDING THE BOTANICAL NAMES ACCORDING TO PROF. ASA GRAY AND PROF. C. S. SARGENT.

The letter on the right of each botanical name is the initial of the common name. The botanical name according to Prof. C. S. Sargent is referred to that according to Prof. Asa Gray.

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Hawthorn, Tall	*Cratægus viridis*	Rose.	136
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Maple, Red	*Acer rubrum*	Soapberry.	205
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